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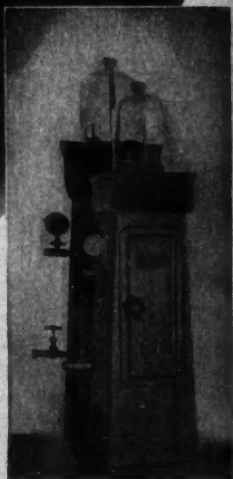
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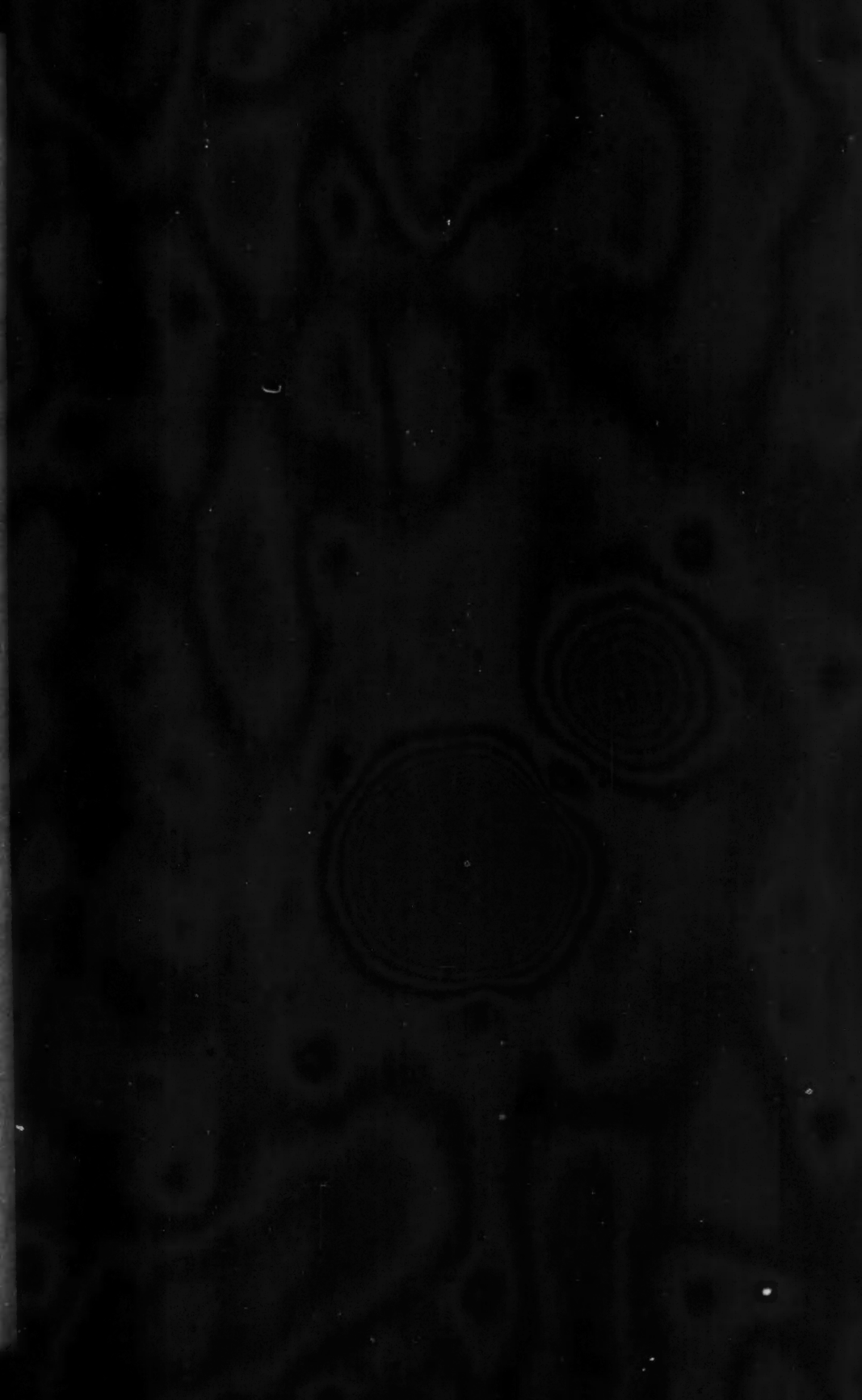
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The Treatment of Pneumonia With Concentrated Serum—With a Preliminary Report of Twenty-two Cases

M. H. BROWN, M.D.,

Research Associate, Connaught Laboratories, University of Toronto

THE treatment of pneumonia with serum is not of recent origin. As early as 1891 Foa and Carbone (16) demonstrated that the serum of rabbits which had received injections of pneumococci possessed the property of protecting other rabbits against infection with the strain used. Following this observation these workers treated cases of pneumonia in the human subject with the serum of immunized rabbits. The quantity of serum used was of necessity small, and no exact determination of its strength was made. One of the earliest attempts to use anti-pneumococcic serum on a more rational basis was made by Washbourn, (31) who, in 1897, used serum from a horse which had received subcutaneous injections of pneumococci. The serum was tested for potency by injecting known amounts of micro-organisms and dilutions of the serum into rabbits. In this way an arbitrary unit, based on the protective power of the serum in rabbits, was established. In the treatment of pneumonia in man, this serum was given subcutaneously in doses not exceeding 20 cc.

It was not until some time later that the causative agent of pneumonia was shown to be a micro-organism showing distinct serological types. Neufeld and Haendel (23) in Germany and Dochez and Gillespie (13) of the Rockefeller Institute for Medical Research demonstrated the existence of three specific types which were designated Types I, II, and III, and the remaining heterogeneous strains were classed together as Group IV. This classification has received almost universal acceptance and has made possible a rational basis for the serum treatment of pneumonia. Following this, Dochez and Avery showed that wherever pneumococci of Types I, II or III are grown in fluid media, there is present in the cultural fluid a substance which is precipitated in the presence of anti-pneumococcus serum of the homologous type. This soluble substance was demonstrated in culture

*Presented at the Academy of Medicine, Toronto, January 13th, 1931.

filtrates even during the initial period of rapid multiplication when little or no cell death or disintegration occurs. Examination of the blood and urine of experimentally infected animals showed in them the presence of this substance in considerable quantities. Similarly, a study of the serum of patients suffering from lobar pneumonia has revealed a substance of like nature in the blood during the disease and in the urine in approximately two-thirds of the cases.

The specific substance is not destroyed by boiling, is readily soluble in water and is precipitated by acetone, alcohol and ether. This substance has been demonstrated to be of the nature of a polysaccharide and is chemically different in Types I, II and III. Thus chemically as well as serologically, these three types have been differentiated. The exact proportion of these types occurring in pneumonia cases varies

TABLE I

THE FREQUENCY OF PNEUMOCOCCI IN LOBAR PNEUMONIA AS RECORDED BY VARIOUS OBSERVERS

	Period	Total No. of Cases	Frequency in Percentage			
			Type I	Type II	Type III	Group IV
<i>United States of America:</i>						
Dochez and Gillespie (13)	1913	74	47	18	13	22
Cole (10)	1915	150	38	30	11	21
Thomas (29)	1917-21	239	25	11	15	49
Schorer (25)	1917-18	101	31	15	18	36
Cecil, Baldwin and Larsen (5)	1921-26	1,913	34	19	13	33
Park, Bullowa and Rosenbluth (24)	1928	793	28	15	11	46
Cecil and Sutliff (6)	1928	885	34	24	11	31
<i>Great Britain:</i>						
Glynn and Digby (14)	1919-23	361	38	27	4	31
Griffith (18)	1920-22	150	31	33	7	30
Davidson and McLachlan (12 and 22)	1924-25	52	64	7	15	14
Ferguson and Lovell (15)	1925-27	116	43	4	0	53
Alston and Stewart (26)	1929-30	186	29	40	4	27
<i>South Africa:</i>						
Lister (20)	1917	148	22 (C)	16 (B)	1 (E)	61 (A,D,etc.)
<i>India:</i>						
Malone (21)	1923-24	106	28	17	8	47
<i>Denmark:</i>						
Christensen (9)	1923	110	33	27	8	32
<i>Norway:</i>						
Thjøtta and Hanneborg (28)	1924	100	44	33	6	17
<i>Toronto</i>	1930	56	43	20	11	26

in different places at the same time and at different seasons in the same place. In order to compare the incidence of these types, reference to Table I shows a summary of findings in various countries. The results from Toronto during 1930 are the findings of an investigation carried on by the Connaught Laboratories in co-operation with the various hospitals in the city. The sputum was forwarded to the Laboratories for typing immediately the diagnosis of pneumonia was made. (For the agglutinating sera we are indebted to Dr. W. H. Park and Miss Cooper of the Bureau of Laboratories, Department of Health of New York City) Thus it is observed that over a number of years and in various countries pneumococci, Types I and II, are responsible for approximately 50 per cent of all cases of pneumonia in adults. In contrast to these findings Table II shows, that, in children, over eighty per cent of the cases are caused by pneumococci other than these three types.

TABLE II

PNEUMONIA IN CHILDREN—BELLEVUE HOSPITAL, NEW YORK*
November, 1928, to April, 1929

(Bacteriological Classification)

	No. of cases	Incidence Percentage
Type I.....	14	9.5
Type II.....	3	2.0
Type III.....	3	2.0
All other pneumococci.....	120	81.6
No pneumococci.....	7	4.8
Total.....	147	

As pointed out in a previous paper the heterogeneous Group IV has been investigated and serologically distinct types have been differentiated. Cooper has now identified twenty-eight types among the strains in the former Group IV, and has produced serologically specific sera for each type. No longer does she refer to Types I, II, III and Group IV, but Types I to XXVIII. The full significance of these findings is not apparent at present, but the knowledge in regard to the high incidence of a few of these newer types may permit of a distinct advance in treatment. Therapeutic serum is being prepared and used for a number of the new types. Table III shows the incidence of these types in Toronto in adults; Table IV shows the incidence in children suffering from pneumonia at the Bellevue Hospital, New York City.

*Plummer, Raia and Selma, *Amer. J. Dis. of Children*, v. 40, pp. 557-568.

TABLE III

INCIDENCE OF CERTAIN TYPES OF PNEUMOCOCCI
Toronto, 1930

	No. of cases
Type V.....	7
Type VII.....	1
Type IX.....	1
Type XV.....	2
Type XVI.....	1
Type XIX.....	1
Undetermined.....	2

ANTI-PNEUMOCOCCUS SERUM

The results of the earlier workers in the treatment of pneumonia were obtained before the immunological differences between types were known. It was soon shown, however, from experiments on animals that an anti-pneumococcus serum is protective only when it is employed to combat an infection due to the homologous type of pneumococcus. The next advance in the use of serum in the treatment of pneumonia was made at the Rockefeller Institute. (2) Serum was

TABLE IV

PNEUMONIA IN CHILDREN—BELLEVUE HOSPITAL, NEW YORK
INCIDENCE OF CERTAIN TYPES OF PNEUMOCOCCI
November, 1928, to April, 1919

	No. of cases	Incidence Percentage
Type I.....	14	9.5
Type II.....	3	2.0
Type III.....	3	2.0
Type IV.....	4	2.7
Type V.....	9	6.1
Type VI.....	19	12.9
Type VII.....	5	3.4
Type VIII.....	1	0.7
Type IX.....	6	4.1
Types X, XI, XII and XIII.....	3	2.0
Unclassified.....	73	49.7
No pneumococci.....	7	4.8
Total.....	147	

produced by immunizing horses with one of the specific types of pneumococcus. The potency of the serum, in units, was determined by mouse protection tests against the homologous strain. The patient's sputum was carefully typed and the homologous serum, Type I or Type II, was given in large doses, intravenously. After considerable

trial the conclusion was reached that Type I anti-pneumococcus serum was highly effective in the treatment of cases of pneumonia due to Type I pneumococcus. The serum of Type II was much less efficacious, and that of Type III was considered to be of no value. The more extended trial of this treatment of Type I cases showed that thermal reactions frequently followed the intravenous use of the serum. Later, Huntoon's "antibody solution" (prepared from the serum of horses immunized with the three fixed types and the antibody obtained by specific absorption when given intravenously to patients suffering from the homologous type of pneumonia), produced beneficial results (5). The thermal reactions following its use, however, reduced its value in treatment. The more recent work has been with a "concentrated" serum. A method of concentration described by Felton is, in general, used to-day in the preparation of concentrated serum.

Felton, in discussing the concentrated serum as prepared by his method, states that the chill-producing factor has been removed, the potency increased to about ten times that of the original serum, and that the total solids are from 4 to 7 per cent. The results outlined in this paper have been obtained with sera concentrated by the Felton method, in the Connaught Laboratories with a few modifications.* Recently Banzhaf has reported a method of producing concentrated anti-pneumococcus serum, without use of the usual salting-out methods, which he believes is free of the chill-producing substance.

Method of Standardization

The mouse protecting value is the basis of the test,* but higher dilutions of both the pneumococcus culture and serum are used than were employed in the test originally described. The unit, which according to Felton is the smallest amount of anti-serum that will protect against 1,000,000 minimal lethal doses of virulent pneumococci as expressed is not a fixed or definite standard comparable to that used in the standardization of diphtheria antitoxin. Too much importance, therefore, should not be given to the significance of units as now expressed.

Recently Zozaya et al (31), and also Heidelberger et al (19), have suggested methods of potency testing using the specific soluble substance for *in vitro* tests. These methods may prove to be advances in the standardization of anti-pneumococcus serum. At the moment the protection test is the one in common usage.

*Details of the methods employed in the preparation and testing of concentrated serum used in the treatment of the cases recorded in this paper may be found in a previous paper by the author entitled, "Recent Advances in the Laboratory Diagnosis and Specific Treatment of Pneumonia," *Canadian Public Health Journal*, v. XXI, No. 9 (Sept.), 1930.

ESSENTIAL STEPS IN SERUM TREATMENT

The first requisite in the serum treatment of pneumonia is the determination of the type of pneumococcus causing the pneumonia in the case, and second, the administration of serum at the earliest possible moment.

Laboratory Diagnosis

Typing of Sputum—The sputum is typed by the "rapid" method outlined on pages 154, 155 and 156 of this Journal. This is a very rapid, reliable method by which the type is determined within three or four hours of obtaining the sputum.

If a sample of sputum cannot be obtained, pharyngeal swabs should be taken. The swabs are placed in broth and incubated for three or four hours. The culture is then injected intraperitoneally into a mouse, the subsequent procedure being the same as with a sample of sputum. A second method for determining the causative type is used. The procedure consists of administering to the patient a dose of Type I and II sera, then in two hours pricking the patient's finger and mixing a large drop of blood with killed pneumococci of Type I and Type II. An absence of agglutinins indicates the type of the micro-organism producing the disease. If on repeating this there is still neutralization of agglutinins for one of the types, this may be taken as the type causing the disease.

At the present time Type I and Type II sera are being refined and concentrated for therapeutic use. In the series herein reviewed the sputum was typed first, and only cases infected with Type I or Type II pneumococcus were treated. The concentration of Type III serum has been abandoned after many attempts to produce a potent therapeutic product.

Sensitivity Tests

The patient is questioned as to a history of asthma, hay fever, or any previous injection of antitoxin or serum. It is so important to determine sensitivity to horse serum that the following tests should be carried out:

Ophthalmic Test

This is performed by instilling a drop of a 1 in 10 dilution normal horse serum into the conjunctival sac. A positive reaction is characterized by injection of the conjunctival vessels, lacrymation and itchiness.

Intradermal Test

The skin of the forearm is wiped with alcohol and 0.1 cc. of a

1 in 10 dilution of normal horse serum is injected intradermally. A wheal with pseudopodia, redness and itchiness indicates sensitivity.

These tests may be performed while awaiting the results of typing the sputum, thus saving valuable time.

Dosage of Serum

Refined and concentrated anti-pneumococcus serum is given intravenously. Following Cecil's recommendations, all very ill patients and all Type II cases were given 100 to 120 cc. serum (equivalent to approximately 120,000 units) in the first twenty-four hours (8). This is repeated the following day unless the temperature falls below 102° F. Otherwise 40 to 60 cc. are given on succeeding days until a satisfactory response is obtained. A reduction of the temperature and improved general appearance of the patient are the indices of a satisfactory result. Generally speaking, Type II cases require larger doses than do Type I infections. By actual determination it has been found that the specific soluble substance is more readily neutralized in the blood of patients suffering from Type I infections than in the case of Type II infections.

Administration

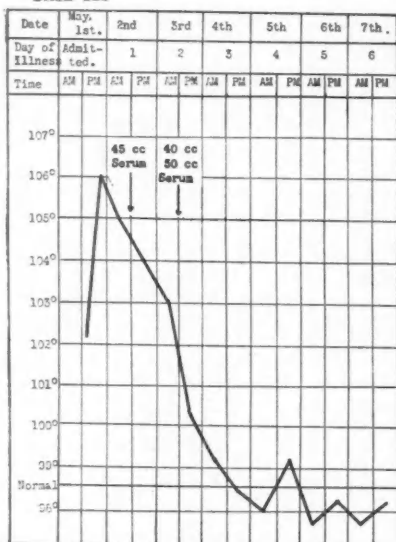
The first injection consists of 5 cc. of serum, intravenously, given very slowly, taking at least five minutes. (The serum should be warmed in a dish of water not over 100° F.). A second dose of 10 cc. is given in two hours and a third dose of 20 cc. in another two hours. It is important to space the doses properly, and to administer the serum as outlined. A fourth dose of 40 cc. is given two hours following the third and this is repeated every two hours until the desired quantity is administered, usually from 100 to 120 cc. in all.

The patient is watched closely during the administration of the serum, and any unfavourable reactions may usually be controlled by 10 minims of epinephrine administered subcutaneously. A slight reaction following the first dose should not deter one from proceeding with serum treatment.

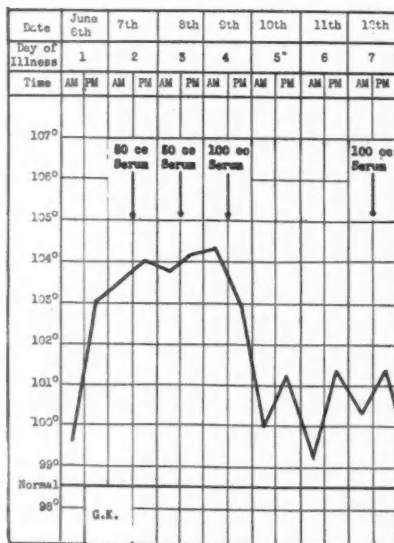
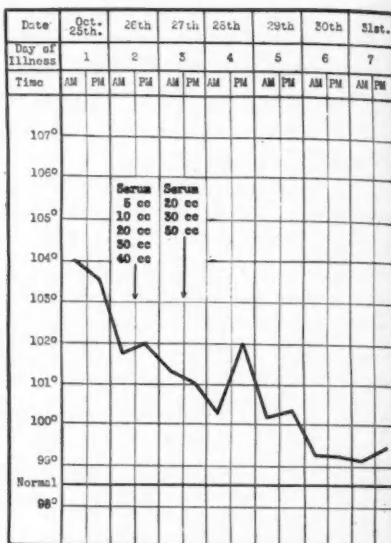
The contraindications to serum therapy are a positive ophthalmic test, or a history of allergy as evidenced by asthma or hay fever. A patient showing only a positive intradermal test may usually be given serum, but caution must be exercised.

The series now recorded is too small for any definite conclusion as to the value of serum treatment in pneumonia, but it would seem to mark a distinct advance. Anaphylaxis was not observed in any case. A thermal reaction occurred in three cases, one after the administration of 70 cc. and the other after 320 cc. in all had been given. These reactions were not of long duration and were followed by a sense of well-being.

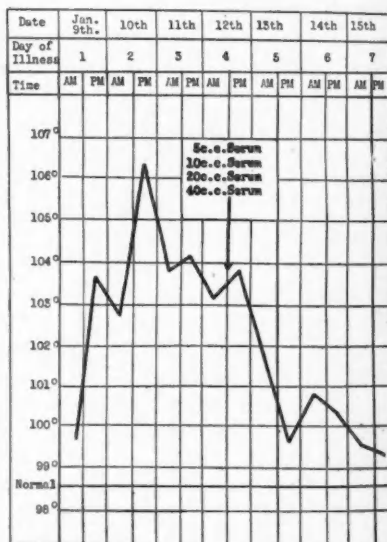
CASE III



CASE VIII



CASE V



CASE I

PLATE I

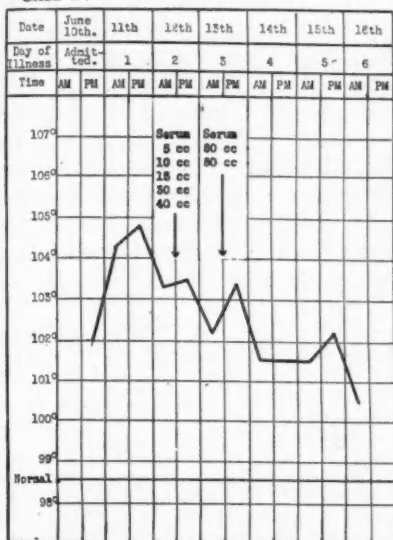
CASE III—Admitted 2nd day of illness, serum (Type II) 3rd and 4th days, uneventful recovery.

CASE VIII—Admitted 3rd day of illness, serum (Type II) 4th and 6th days, uneventful recovery.

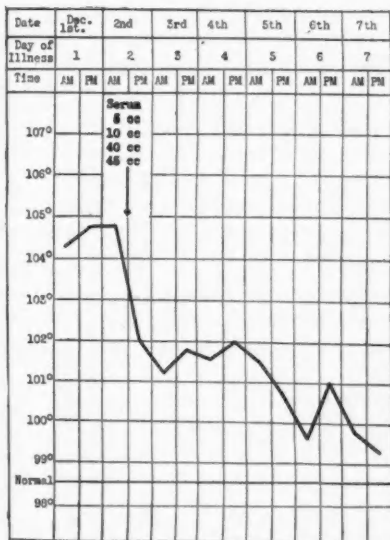
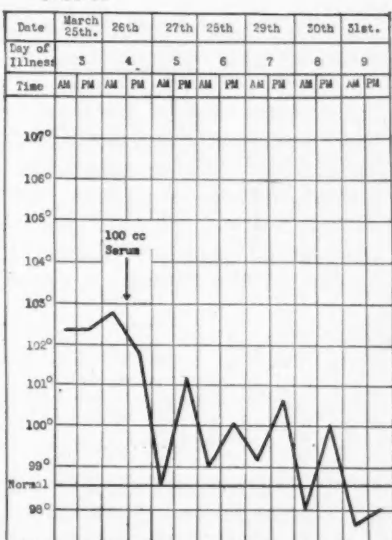
CASE V—Admitted 4th day of illness, moribund, bilateral involvement, positive blood culture, serum (Type II) 6th, 7th and 8th days, good recovery.

CASE I—Admitted shortly after onset, serum (Type I) 3rd day, good recovery.

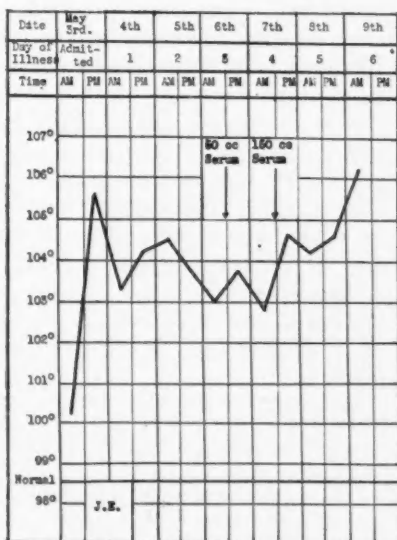
CASE IV



CASE II



CASE VI



CASE VII

PLATE II

CASE IV—Admitted 3rd day of illness, serum (Type II) 4th and 5th days, empyema as a complication but good recovery.

CASE II—Admitted 2nd day of illness, serum (Type I) 4th day, good recovery.

CASE VI—Admitted 3rd day of illness, very ill, irrational, serum (Type I) 4th day, good recovery.

CASE VII—Admitted on 3rd day of illness, serum (Type I) 6th day, very ill, no effect on temperature, died on 9th day.

Of the two deaths among the Type I cases treated with serum, the observations made are interesting. One case was not treated until the seventh day and died on the ninth day. The blood culture was positive and both lower lobes were involved. (See chart for J. E.). The importance of early treatment cannot be over stressed. The other case was apparently making an uneventful recovery having a normal temperature on the twelfth day after admission, when suddenly very severe diarrhoea developed, followed by dry gangrene of one foot and sudden death three days after the line of demarcation appeared. At autopsy the lungs were found to be quite free of any involvement, and apparently the pneumonic process had completely cleared.

	Serum treated	Deaths	Case fatality rate (per 100 cases)
Type I.....	14	2	13.5
Type II.....	8	1	12.4
Total.....	22		

The death in the Type II cases occurred in a patient known to have had a severe nephritis for some time. Treatment was not instituted until the fifth day and the patient died on the eighth day. Among those recovering there were two cases of especial interest. A Type I case, who on admission was extremely ill, with a temperature 105° F., bilateral involvement, and positive blood culture from which Type I pneumococci were recovered. The temperature went as high as 107° F. Serum treatment was instituted and after the first day of treatment, patient was so ill that even oxygen therapy was discontinued. The patient rallied, treatment was continued, and in all 425 cc. of serum were given. The patient made a good recovery. The other case, G. K., a Type II infection, was admitted in a moribund state on fourth day of illness. Besides having a bilateral involvement, the blood culture was positive for Type II pneumococcus. Serum treatment was instituted and in all 220 cc. were given with good recovery.

The more notable effects of serum treatment from a clinical standpoint are:

- (1) Symptomatically, the change is very striking, from a markedly distressed condition the patient takes on a much more comfortable appearance.
- (2) The period of toxicity is greatly reduced. Natural sleep returns more quickly as does appetite.
- (3) Convalescence is more rapid.
- (4) The temperature usually drops rather abruptly following the use of serum as illustrated in the accompanying charts.
- (5) No great change in the physical signs is noted. In other words, resolution does not set in immediately the patient shows general improvement. In fact in a few cases resolution has taken a little longer but without discomfort to the patient.

Serum treatment in no way supplants the recognized therapy for conditions such as anoxaemia, (4) cardiac failure and that perplexing complication known as "medical shock" so ably outlined by Atchley (1).

SUMMARY

- (1) The sputum should be typed by the "rapid" method as soon as possible after diagnosis of pneumonia is made.
- (2) The patient should be tested for sensitivity to horse serum.
- (3) Cases in which the causative organism is Type I or Type II pneumococcus are suitable for treatment with serum.
- (4) The serum is given intravenously and *as early as possible*. Clinical improvement is the criterion for reducing the amount or discontinuing serum treatment.
- (5) In cases treated with Type I or Type II concentrated serum the mortality is considerably reduced.

For the clinical data pertaining to the majority of these cases, the author is indebted to Dr. George C. Anglin, Attending Physician, The Toronto Western Hospital.

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Interpretation of Rates in Canadian Vital Statistics*

W. R. TRACEY

Dominion Bureau of Statistics, Ottawa

IT is desirable to make brief reference to three factors which affect in an important way the interpretation of rates. The first is the *degree of completeness of registration*, on which, indeed, the validity of all rates is dependent. As it is not possible in this paper to discuss adequately this factor, I will simply state that such tests as we have so far been able to make indicate that while our registration system has a few weak or doubtful spots, it shows in general a satisfactory degree of completeness.

The second factor which must be passed over, too, in very summary fashion is *the size of the numbers involved in the computation of rates*. The consideration of this subject would lead us into the realm of higher mathematics. One illustration, however, may serve to show the application of the generally accepted formula to two important rates.

The usual rates for infant mortality and for maternal mortality are both based on the number of live births as divisor, but the number of mothers who die (the dividend in the computation of maternal mortality) is, of course, much smaller than the number of infants who die (the dividend in the computation of infant mortality). To take a theoretical case, let us suppose that a large city with unchanging conditions, in which 10,000 births are recorded in a year, has a normal infant mortality rate of 55 per 1,000 and a normal maternal mortality rate of 5.5 per 1,000, the two rates being taken for convenience as in the exact proportion of 10 to 1. Then according to the customary formula, the probable error of the maternal mortality rate, that is the deviation which, without any change in conditions, is just as likely as not to occur in the rate through the operation of chance, amounts to approximately 0.5 per 1,000 births†. But the probable error of the infant mortality rate is not ten times this, or 5 per 1,000; it is only about 1.54 per 1,000. Thus, under the conditions stated, and considering only the size of the figures involved, a change in the infant mortality rate would have as much significance as more than three times the same proportionate change in the maternal mortality rate. As to the applicability of this imaginary instance, it may be stated that British Columbia is the only province in Canada in which the infant mortality rate is generally less than ten times the maternal mortality rate.

The third factor to which brief reference must be made is the *method of assignment of events to local units, whether to the place of residence or to the place where the event occurred*. This question resembles completeness of registration in being too important for cursory treatment, and has very fittingly formed the subject of one of the papers delivered at this meeting. As, however, references to rates throughout the remainder of this paper are concerned with no units smaller than provinces, the consideration of this factor is unnecessary.

†We have ignored the fact that the smallness of the maternal mortality rate makes the probability of a given chance variation in excess appreciably different from that of an equal chance variation in defect. This fact does not detract from the general conclusion.

*Presented at the Vital Statistics Section, Canadian Public Health Association Annual Meeting, Toronto, May, 1930.

DEATH RATES

The inadequacy of crude death rates as an index of the comparative health or longevity of communities is doubtless familiar to all here present. The high mortality of infancy and of old age, in contrast with the low rates for the middle periods of life, quite evidently tend to make a crude death rate dependent to a considerable extent on the age-composition of the population.

TABLE A

INDEX DEATH RATES AND PROPORTION OF CRUDE TO STANDARDIZED RATES

	Population as of 1921		Proportion of crude to stan- dardized rates 1921-23, adjusted (1)	Population as of 1926	
	Index death rates	Proportion to rate for Canada		Index death rates	Proportion to rate for Canada in 1921
	1	2		4	5
CANADA	10.5	p.c. 100	p.c. ...	...	p.c. ...
Prince Edward Island....	14.1	134	130	...	...
Nova Scotia.....	12.6	120	117	...	...
New Brunswick.....	11.7	111	111	...	...
Quebec.....	10.4	99	...	...	...
Ontario.....	11.2	107	107	...	...
Manitoba.....	9.2	88	89	9.5	90
Saskatchewan.....	8.9	85	86	8.9	85
Alberta.....	8.8	84	87	9.0	86
British Columbia.....	9.3	89	92	...	...
Reg. Area as of 1921.....	10.6	101	101	...	...

(1) Adjustment consists in reducing all percentages in the ratio 101/104, since 104 was percentage obtained for Registration Area as of 1921, and it is desired to make this key figure equal to the corresponding figure of Column 2.

Index Death Rates

Table A shows in columns 1 and 4 index death-rates for Canada and its nine provinces according to the age and sex-composition of the populations in 1921 and for the three Prairie Provinces according to the census of 1926 as in Table A. The method by which these index death rates were computed was to divide the population into eleven age-groups for each sex and to apply to a group the same death rate throughout all the provinces. The death rates chosen were those of the Registration Area as of 1921, averaged for the years 1921-23. The addition of the deaths thus obtained in all age-groups for a province gave a total which when divided by the total population of stated ages resulted in the index death rate. Since the same set of specific death rates was applied throughout the provinces, the differences between the index death rates for the various provinces are wholly due to their relative advantage or disadvantage in age composition. In columns 2 and 5 the rates have been reduced to a percentage with the rate for all Canada as base. This column shows, therefore, in percentage form the proportion which the crude rate for

each province might be expected to bear to the crude rate for Canada if all conditions apart from age and sex distribution of the respective populations were exactly similar. The high index rates of the Maritime Provinces and particularly Prince Edward Island are in sharp contrast to the figures for the four Western Provinces. The fact that the Ontario rate exceeds that of Quebec by a substantial margin may occasion surprise, in view of the large number of infants subject to high mortality rates in the latter province, but this is evidently more than compensated by the higher proportion in Quebec at the later ages of childhood where mortality is very low, and the smaller proportion in the old age-groups.

Standardized Death Rates

In some of our annual reports we have made a computation for the provinces which is the converse of that described above—that is, instead of applying a standard set of rates to the age-groups of the population of each province, we have in these reports applied the actual rates of each province to a standard population—the standard million of England and Wales in 1901. The summary rates obtained in this way are called standardized or adjusted rates, and they are supposed to allow proper comparison between the mortalities of communities when the influence of age and sex-distribution of the population is removed. But I wish to point out here that neither the index death rates shown in Table A nor the standardized death rates which I have just mentioned must be interpreted too closely. Column 3 of Table A shows in percentage form the quotient when the crude rates, averaged for the years 1921-23, are divided by the standardized rates averaged for the same years, a slight adjustment being subsequently made to bring the key percentage, that of the Registration Area, to the same figure as in column 2. As Quebec was not at that time in the Registration Area, and its returns of deaths would, therefore, not be exactly comparable with those of the other provinces, this province has been omitted from the computation in column 3. This necessitated also omitting Canada. Now this proportion of crude to standardized rate should depend solely on the age and sex composition of the population and ideally the figures of column 3 should, therefore, be identical with those of column 2. A degree of roughness in the computations would account for slight differences. The correspondence between the two columns is, indeed, on the whole reasonably close, but the divergences suggest that neither index rate nor standardized rate is a perfect measurement. The reasons are not far to seek. The index rate is affected by the nature of the set of rates applied to each population. It might be that if the rate of Quebec had been applied to each province instead of the rates of the Registration Area, the index rate of Quebec itself would have shown less favourably as compared with Ontario, owing to the application of a heavy infant mortality rate to its large number of babies. The standardized rate, on the other hand, is affected by the manner in which the standard population is made up. It is quite possible that one country or province might show a slightly lower rate than another when both are standardized on the basis of the English standard population, and a slightly higher rate when both are standardized by some different standard.

Specific Death Rates

The specific death rates for *narrow age-groups* are, of course, the rates which have full significance. This full significance is, however, attained only for the census year and perhaps one or two years on each side of it. Farther away from the census there are two sources of danger—the possibility of error in the estimate of total population and in the assumption that the age-distribution has remained constant. In a country like Canada, whose population is

much affected by migration, the change in age-distribution in a decade is sometimes remarkable. Between 1901 and 1911, owing to heavy immigration, the proportion of the male population found in the age-group 25-29 years increased by 23 per cent; in the next decade, with the loss of lives in the war and its influence on immigration, the proportion decreased by 21 per cent.

The danger of using age-groups which are too broad in the comparison of death rates may be well exemplified from some work undertaken in the Bureau of Statistics several years ago at the request of the Health Section of the League of Nations. The years covered by the enquiry were 1922-1924 and it was desired to obtain a coefficient of correlation between death rates from cancer and death rates from unknown or ill-defined causes, both rates being based on population over 40 years of age. The Health Section evidently intended by basing rates on population of the "cancer age" only, to remove those inequalities due to different age-distribution of population. But between some of the Canadian provinces the method failed to remove those inequalities, because the age-group was too broad. The population over forty years of age in the Western provinces was heavily weighted by the number near the minimum age, while in the Maritime Provinces this age-group contained a much higher proportion at the more advanced ages. Thus the cancer rate for Nova Scotia obtained by this method was 64 per cent greater than the rate for Saskatchewan, whereas a previous computation we had made for the year 1923, using ten-year age-groups above forty years as the basis for standardization, left the Nova Scotia rate at most 16 per cent above that of Saskatchewan when the effect of differences in age-composition were thus largely eliminated. It may be noted that the crude cancer rates for Nova Scotia for the three years 1922-24 averaged about double those of Saskatchewan.

Infant Mortality Rates

Though annual infant mortality rates are usually expressed as the proportion of infant deaths during a year to the births during the same year, it is, of course, evident that the deaths which take place are in some cases those of infants born in the past year, but who had not attained their first birthday at the time of death. The period of risk within a given year averages six months both for infants born in that year and those born in the past year. But the nature of the risk is very different. The very high risk of mortality during the first hours, days and weeks of existence is mainly undergone by infants during the same year in which their birth took place. It is, therefore, not surprising that when figures are available, as in Canada, for the subdivision of infant mortality according to the year of birth, the great majority of the infants who died in a given year are found to have been born in the same year. The proportions for the whole of Canada for the years 1926-28 are shown in Table B and amount to 78.1 per cent in 1926, 78.2 per cent in 1927, and 79.5 per cent in 1928. These percentages are somewhat higher than German figures of the same kind which were used in the construction of United States life tables, indicating that more of Canadian infant mortality is amongst the new-born. With such a large proportion of infant mortality resulting from the births in the same twelve-month period, it does not appear necessary under ordinary circumstances to take into account the births of the preceding year in forming a rate. When, however, a very abnormal change in the number of births takes place, special methods may require to be used to correct the infant mortality rates. This was done in England at the end of the war, but the corrections take no account of the higher risk at the younger ages.

Monthly rates of infant mortality based on the comparison of deaths during the month with the number of births during the same month stand on a much less secure basis. As will be seen from Table B, the proportion of deaths of infants born during the month of death is only in the neighbourhood of 40 per cent. A correction is sometimes made by relating the deaths during a month to the births during that month and the previous eleven months, but

while this figure is probably more accurate than the first mentioned, it fails to take into account the marked decrease in risk as the month of birth becomes more remote. This decrease is brought out strongly in Table B,

TABLE B

DISTRIBUTION OF INFANT DEATHS (UNDER ONE YEAR) IN CANADA IN 1926, 1927 AND 1928, ACCORDING TO YEAR AND MONTH OF BIRTH

<i>Period in which born</i>	<i>1926</i>	<i>1927</i>	<i>1928</i>
	<i>p.c.</i>	<i>p.c.</i>	<i>p.c.</i>
<i>Year of death.....</i>	<i>78.1</i>	<i>78.2</i>	<i>79.5</i>
<i>Past year.....</i>	<i>21.9</i>	<i>21.8</i>	<i>20.5</i>
(a) <i>Month of death.....</i>	<i>38.3</i>	<i>38.8</i>	<i>40.1</i>
(b) <i>Month next preceding (a).....</i>	<i>14.1</i>	<i>14.7</i>	<i>14.2</i>
(c) <i>Two months next preceding (b).....</i>	<i>16.5</i>	<i>16.6</i>	<i>16.2</i>
(d) <i>Three months next preceding (c).....</i>	<i>14.7</i>	<i>14.6</i>	<i>14.3</i>
(e) <i>Three months next preceding (d).....</i>	<i>10.4</i>	<i>9.5</i>	<i>9.4</i>
(f) <i>Three months next preceding (e).....</i>	<i>6.0</i>	<i>5.8</i>	<i>5.7</i>

where in contrast to some 40 per cent of deaths from the births of the same month you have only about 6 per cent or an average of 2 per cent per month from the births of the three most remote months. The calculation of a monthly rate of infant mortality which would take all these facts into account would require to be somewhat elaborate, perhaps more elaborate than the value of the results would justify.

MARRIAGE RATES

Crude marriage rates serve well for comparisons in time and afford a valuable economic index. The interpretation, however, of differences in the crude marriage rate between countries or provinces offers particular difficulty owing to the importance here of the sex-proportions, and the fact that measurement of the probability of getting married at certain ages may show an advantage to one province or country for the one sex and a disadvantage for the other. An illustration affecting the Prairie Provinces may make this clearer. The crude marriage rate for the year 1926 was 7.1 per 1,000 in Manitoba, 6.7 in Saskatchewan and 7.4 in Alberta. Let us now consider the marriage rates for each sex and for 5-year age-groups from 15 to 50 years, as given in Table C. These rates are for first marriages and are based on the number of single persons in the population.

It is noted that while the Alberta rates show a general advantage over Saskatchewan for both brides and grooms, the Manitoba rates are in excess of Saskatchewan rates for grooms throughout all groups and fall below them for brides throughout all groups. One reason for this difference between the two sexes is not far to seek. In Table D you are given the masculinity of the total population and of the single population in each province by five-year groups from 15 to 50 years.

TABLE C

MARRIAGE RATES OF SINGLE MALES AND FEMALES IN PRAIRIE PROVINCES, 1926

(First marriages in proportion to single population)

Age group	Grooms per 1,000 single males			Brides per 1,000 single females		
	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta *
Total, 15-49 years.....	48.0	41.5	45.9	67.7	83.9	90.1
" 15-19 years.....	2.0	1.9	2.4	34.0	46.8	47.5
" 20-24 years.....	59.5	56.6	61.8	116.4	154.8	166.2
" 25-29 years.....	120.0	96.0	103.2	130.3	149.0	171.9
" 30-34 years.....	112.1	78.0	86.8	84.6	109.5	108.6
" 35-39 years.....	69.3	45.9	53.2	47.4	71.7	80.8
" 40-44 years.....	32.6	29.1	29.7	16.9	47.0	38.4
" 45-49 years.....	21.6	11.0	17.7	14.1	19.5	31.0

In many cases, of course, women marry men of a higher age-group, but as between the three provinces the table throws considerable light on the comparative opportunity for marriage available to each sex.

TABLE D

PROPORTION OF MALES TO 1,000 FEMALES IN PRAIRIE PROVINCES AT AGES 15-49 YEARS, 1926

Age group	Total Population			Single Population		
	Manitoba	Saskatchewan	Alberta	Manitoba	Saskatchewan	Alberta
Total, 15-49 years.....	1,078	1,283	1,269	1,369	1,985	1,968
" 15-19 years.....	1,004	1,077	1,056	1,054	1,154	1,137
" 20-24 years.....	985	1,223	1,160	1,397	2,114	2,007
" 25-29 years.....	976	1,194	1,186	1,874	3,742	3,463
" 30-34 years.....	1,008	1,229	1,218	2,002	4,943	4,372
" 35-39 years.....	1,159	1,392	1,382	2,255	6,579	6,011
" 40-44 years.....	1,251	1,572	1,536	2,014	7,381	6,745
" 45-49 years.....	1,316	1,552	1,567	2,399	6,933	6,192

The single population at any time represents a residue after equal numbers are withdrawn from the two sexes by marriage, therefore in this residue the original inequality is augmented. It may be asked why the deficiency of males in the age-groups 20-24 and 25-29 in the total population of Manitoba does not result then in a still greater proportional deficiency in the single population. Presumably it would, but for the reason that women do not necessarily marry men of the same age-group. The effect can probably be seen in the depression of the sex-ratios for single population in the higher age-groups.

The higher masculinity of Saskatchewan in total and much more in single population affords then a reasonable explanation of its higher marriage rates for brides and its lower rates for grooms when compared with Manitoba. The fact that with higher masculinity rates in the main than Alberta, Saskatchewan's marriage rates for females were generally lower than in the latter province indicates a difference arising from reasons independent of sex-proportions.

BIRTH RATES

The effect of age and also of sex-composition on the crude birth rate is fairly obvious, though possibly it does not receive such frequent consideration as in the case of death rates. Taking the two most populous provinces of Canada, the crude birth rate of Quebec far exceeds that of Ontario. For the year 1928 the figures were 31.6 per 1,000 for Quebec and 21.2 per 1,000 for Ontario. But the real fertility of the population of Quebec may be higher as compared with Ontario than even these figures indicate. For by reason of its very fertility, the population of Quebec tends to have constantly a greater proportion of children than Ontario as compared with the adults of reproductive ages.* In 1921, children under 15 years of age formed 38.05 per cent of the population of Quebec, but only 30.16 per cent of the population of Ontario. The effect on the crude birth rate of this disproportion in the number of children is readily apparent. In a study published in the *Journal of the American Statistical Association* in September, 1925, Dublin and Lotka stress the importance of this tendency of high fertility in a population to raise an obstacle to its full expression in the crude birth rate. They emphasize also the cognate fact that a decline in fertility from the previous generation produces a population which as a result of that very decline is favourably constituted as to age for the registration of a high crude birth rate. The effect of recent immigration in swelling the proportion of persons at the reproductive ages is at once obvious. All of these considerations show that the comparison of crude birth rates of two communities will not serve as a reliable indication of the difference in the respective rates at which the present generation of adults is reproducing itself. More accurate means of measurement are necessary.

A "corrected" birth rate is sometimes made by taking the proportion between the number of legitimate births and the number of married women between the ages of 15 and 45 years. As Professor Kemp points out, however, in his study on *Fertility of Marriage in Canada*†, this rate is by no means dependable. The matter is, in fact, another illustration of the danger in using broad age groups, to which we have already given some attention in the discussion of death rates. Professor Kemp shows clearly that the age distribution of Canadian born,

*The possible effects of differential immigration are ignored.

†In "*Contributions to Canadian Economics*," Vol. I, 1928, published by the University of Toronto.

British born and foreign born married women of child-bearing ages shows such differences, and the fertility at the younger ages within these limits is so greatly in excess of that of the older ages, that the differences in age distribution alone can produce a well-marked disparity in the rate based on the whole child-bearing group. For a satisfactory measure of fertility, therefore, we require the proportion of the number of children born to married mothers in narrow age-groups (say of five years) to the number of married women in the respective groups.

It will be seen that such rates measure only the fertility within marriage. Other rates, such as the proportion of married women to all women within a group, and the proportion of males to females may have an important bearing on the relation of the actual to the potential fertility.

The information regarding *order of births* which is obtained on Canadian birth certificates is of considerable value in the study of fertility. It requires, of course, to be treated in relation to the age of mothers. The duration of marriage would make another valuable basis of classification in connection with order of birth, but this information is not available on the birth certificates of most Canadian provinces. It will be apparent, however, that the number of children a woman has borne reflects not only her fertility within marriage but also the influence of a late or early marriage. One weakness in computations based on Order of Birth tables is that since the information is recorded solely from the women who bore children in any given period, it can throw no light on the percentage of women in the different classes who remain childless. On the other hand the fact that tables based on Order of Birth are analysed without reference to population statistics, gives them a value of their own, particularly with regard to classifications such as that by occupation, where the difficulty of bringing together on an accurate basis the classes derived from two different sources is very great.

It may not be amiss to conclude this discussion of the interpretation of birth rates with the following illustration:

The census of the Prairie Provinces taken in 1926 gives us later population data for these provinces than for the remainder of Canada; I shall, therefore, select for consideration the crude birth rates for the combined Prairie Provinces in 1921 and 1926 and attempt some analysis of the difference by means of the detail tabulated in Section E of the accompanying tabular matter.

SECTION E

FERTILITY IN PRAIRIE PROVINCES, 1921 AND 1926

	1921	1926
E 1. Crude birthrate per 1,000 population.....	29.4	24.1
E 2. Percent proportion of female to total population.....	45.9	46.3
E 3. Percent distribution of female population by age—		
Under 15 years.....	40.6	39.1
15-44 years.....	46.0	45.6
45 years and over...	13.4	15.3
Total.....	100.0	100.0
E 4. Percent proportion of women aged 15-44 years to total population.....	21.1	21.1
E 5. Percent proportion of women aged 15-44 years to men aged 20-49 years...	86.2	91.1

As shown in E 1, the crude birth rate for this area fell from 29.4 per 1,000 in 1921 to 24.1 per 1,000 in 1926, the latter figure being 82.0 per cent of the

former. E 2 shows a slight increase during the five years in the proportion of female to total population, but on the other hand it can be seen from E 3 that the proportion of women of child-bearing ages to the total number of females underwent a slight decrease, the net result, shown in E 4, being that the proportion of women between the ages of 15 and 45 years to the total population remained unchanged at 21.1 per cent.

If we leave aside for the moment illegitimate births, which formed only 1.7 per cent of the total in 1921 and 2.5 per cent in 1926, we are particularly concerned with married women. The first two columns of the table E 6 show that the proportion of married women of the whole group 15-44 years to all women of the same group declined from 65.4 per cent to 60.4 per cent as in Table E 6. The reductions take place in all age-groups below 35 years, and are proportionately greatest in the lowest groups. The proportion of women aged 15-44 years to men of the group 20-49 years, which may be considered roughly equivalent for mating purposes, increased, as shown in E 5, from 86.2 to 91.1 per cent in the five years, and it is reasonable to suppose that this increase, by limiting the choice of the average woman, tended to the reduction in the proportion of married women.

TABLE E 6

STATISTICS OF MARRIED WOMEN AGED 15-44 YEARS, 1921 AND 1926

Age group	Proportion of married women to all women of same age groups		Proportionate distribution of married women by age groups		Births per 1,000 married women of given age groups	
	1921	1926	1921	1926	1921	1926
	<i>p.c.</i>	<i>p.c.</i>	<i>p.c.</i>	<i>p.c.</i>		
Total, 15-44 years.....	65.4	60.4	100.0	100.0	208	183
15-19 years.....	9.7	6.4	2.9	2.4	411	433
20-24 years.....	53.9	44.8	14.4	13.0	361	348
25-29 years.....	79.2	76.8	21.8	19.7	261	244
30-34 years.....	87.5	87.2	22.9	22.2	198	177
35-39 years.....	89.5	89.7	21.6	23.3	143	121
40-44 years.....	88.8	89.0	16.3	19.3	66	57

NOTE—The application of the 5 year group rates of 1926 to the proportionate distribution of married women in 1921 would result in a rate of 192 per 1,000 for the whole group aged 15-44 years.

Turning attention again to Table E 6, columns 3 and 4 show a distribution of married women of 15-44 years less favourable to fertility than in 1921. Finally, the last two columns of E 6 show a reduction in the rate based on all married women in the child-bearing period from 208 per 1,000 in 1921 to 183 in 1926. That this reduction is only in part due to their more unfavourable age-distribution in the later year is shown by the individual age-group figures in the last two columns. Every five-year age-group except that of 15-19 years has a lower birth-rate in 1926 than in 1921. Owing to the small number of wives aged 15-19 years, the change in rate in this group has little effect on the total rate.

The analysis stops here and does not take account of those changes in the population, in racial origin, in nativity, in rural and urban residence, etc., which have without doubt, important bearing on the rates quoted above. For detailed comparisons along some of these lines the data are not sufficient, and in any case their consideration would carry us far beyond the time available for this paper. The note to Table E 6 states that the application of the fertility rates of 1926 to the age-group populations of 1921 would have resulted in a fall from 208 to 192 in the rate for all wives of child-bearing ages. It must be noted, however, that the application of 1921 rates to 1926 population, quite as legitimate a procedure, might not give quite the same relation between the rates for the whole group. Omitting this consideration, the fall from 208 to 192 may be looked upon as resulting from the decline in fertility in the individual age-groups of married women. The latter figure is 92.3 per cent of the former. Then the fall from 192 to 183 may be regarded as due to the change from more to less favourable age-distribution of the wives of child-bearing ages. The latter figure is 95.3 per cent of the former. Now as already seen, wives aged 15-44 years formed 65.4 per cent of all women of the same ages in 1921 and only 60.4 per cent in 1926. The latter figure is 92.4 per cent of the former.

From the figures we have considered, we see that the decline in the crude rate was brought about by several factors working in conjunction. While the proportion of women of child-bearing age to the whole population was between 1921 and 1926 unchanged, the proportion of these who were married was reduced, the age-distribution of the married was more unfavourable, and the fertility of the married women in the individual age-groups was less. Let us see in what measure these contributed to the fall in the crude rate.

We have noted three significant reductions, and taking in each case the 1926 figure as a percentage of the 1921 we have—

A reduction to 92.3 per cent owing to lower fertility within age-groups.

A reduction to 95.3 per cent owing to a more unfavourable age distribution of married women of child-bearing ages.

A reduction to 92.4 per cent owing to the lower proportion of married women of child-bearing ages to all women of these ages.

As the three factors act together, the product of the three figures is taken. This product is 81.3 per cent. Now the crude rate in 1921 was 29.4 and in 1926 it was 24.1. The latter figure is 82.0 per cent of the former. The difference, which is very slight, between this and our product is easily accounted for by illegitimate births, births to women over 45 years, and failure to carry our fertility rates for married women into decimal places.

20th ANNUAL MEETING
CANADIAN PUBLIC HEALTH ASSOCIATION

6th ANNUAL MEETING
SASKATCHEWAN HEALTH OFFICERS' ASSOCIATION

HOTEL SASKATCHEWAN, REGINA, SASKATCHEWAN
June 17th, 18th and 19th, 1931

Public Health Nursing in Saskatchewan*

RUBY M. SIMPSON, REG. N.

Director of Nursing Services, Department of Public Health, Saskatchewan

PUBLIC Health Nursing, though only a few decades old, has now its place in every organized public health effort. All urban public health work is more completely organized than that in rural areas. It was begun earlier, chiefly for the reasons that its call was more articulate, its work more easily accessible, its funds more readily available and its results possible of more definite tabulation. Some provinces in Canada report chiefly on urban work. With over seventy per cent of our people living in rural areas, this is impossible in Saskatchewan. A true picture of public health nursing effort in this province must concern itself chiefly with rural work.

Types of Public Health Nursing

There are two generally accepted types of public health nursing—first, bedside care or visiting nursing carrying also an educational programme in the home, and second, an educational programme which includes the entire community but omits the bedside care. The first is more adaptable to centres of population, cities or small, closely settled, rural areas. In Saskatchewan we have adopted the second type, the educational programme. Some bedside care is inevitable, since emergencies will arise, but every effort is made to keep it at a minimum. The Union Hospital, the Red Cross Outpost Hospital and the small private hospital are the main sources of bedside care in many places in this province and are giving admirable service. The care of the patient in the home in rural areas is a problem still unsolved.

For the past two years, our type of organization in public health nursing has been that known as "generalized". This term is used in contrast to "specialized" to indicate a service in which all the public health nursing in the community is carried by one nurse instead of having special nurses for school, infant welfare or communicable diseases working in the same community. For rural areas the generalized system obviates duplication of travel, of expense and of effort, provides the nurse with a diversity of opportunity to know the health problems of the community and gives the community a greater opportunity to know the nurse and the aims of her work. A greater volume of work, a greater variety of work and greater interest on the part of both public and nurse, are possible under this plan.

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Every service, with the exception of bedside care, is performed by the nurse who is working under the generalized plan. This includes pre-natal, infant welfare, pre-school, school, tuberculosis, trachoma, communicable disease work and a variety of other special needs. All cases of a social nature are included under special needs—relief work, investigation of the mentally unfit, the deaf, the blind and the crippled. It is impossible to entirely separate social service work from the work of the nurse. Anything which affects the family in physical, moral or mental health becomes her responsibility, whether she wishes it or not.

Organization in Saskatchewan

The district for the public health nurse in Saskatchewan is approximately six municipalities in size. The schools in this area, pre-school clinics, home nursing classes and home visits may all be covered fairly well in one year. The nurse then takes the adjoining municipalities for the work of the next year. There are, at present, fifteen such districts with headquarters for the nurse centrally located in each.

There are, as well, three districts in which a combined programme of bedside care and educational work is being carried on—at Preeceville, Neville and Swift Current. The nurse is appointed by the Victorian Order of Nurses and is financed by the Victorian Order, the municipalities concerned and the Department of Public Health. The latter assumes the responsibility for transportation. Bedside care takes precedence in the work routine and the educational programme of the Public Health Department is worked in as opportunities arise. This plan has been found very satisfactory, particularly where the area does not cover more than one municipality.

The nurse in the Health Unit at Gravelbourg works under the supervision of this Division and her work is planned in much the same manner as that of the other public health nurses. With the full-time medical officer of health, however, much more is accomplished, particularly in complete medical examination of school children, in pre-school clinics and in immunization. The work of the public health nurse will receive a considerable impetus when all rural areas are organized on the basis of full-time health units.

It will be seen, then, that we have nineteen public health nurses doing generalized work in rural Saskatchewan. The cities of Saskatoon, Regina, Moosejaw, North Battleford, Weyburn and the town of Melville, maintain their own nursing service, all on the specialized plan, with the exception of North Battleford organized this year, where the service is generalized.

Division of Nurse's Time

The greatest problem in organization is to divide the nurse's time in such a way as to assure equal emphasis on all phases of the work,

in order to give balance to the service. Personal interest and, perhaps, personal ability on the part of the nurse make it very simple for one service to become over-emphasized to the detriment of another, equally important. School work, because of the opportunity afforded for work with children already assembled in groups, must form a large part of the nurse's work. The morning of each day is, therefore, allotted to school health inspection, the remainder of the day being taken for home visits and for any other phase of the work which may arise. The only exception to this division of time occurs in the case of pre-school clinics or immunization, where the nurse, assisting the doctor, gives her full day to this work. Certain features of the various services may be of interest.

Pre-natal Work

Pre-natal work is probably the most important of the services and the most difficult of all to organize. Cases are not easily located and, when located, distance makes regular monthly visits impossible, especially during the winter months. The aim of this work is to urge the expectant mother to visit her doctor at regular intervals, to assist her with preparation for her confinement and to advise regarding personal hygiene during this time. Maternal and infant mortality rates are a cause of grave concern throughout Canada. Pre-natal care is one means of reducing it. During 1929, 240 calls were made in connection with the work, all cases being followed up with pre-natal letters, layette patterns and various forms of helpful literature. Every effort is being made to increase during the present year the number of cases supervised.

Infant Welfare Work

Infant welfare work seeks to assist the mother to bring the child successfully through the difficult first year. Breast feeding is urged or medical advice if artificial feeding is necessary. Diet lists for the various ages provide sound information for the mothers on this subject. One thousand nine hundred and twelve babies were supervised during the year, to some extent at least. Our pre-school examination clinics, sponsored by local organizations of women and conducted by physicians, form the most valuable medium of effort in both infant and pre-school work. Each child is given a complete medical examination and, one or both of the parents being present, all questions relating to the improvement of the health of the child are discussed with them by the doctor. One hundred and twenty-eight such clinics were conducted during 1929, with 6,082 children examined by the local doctors throughout the province. Excellent supervision of the infancy and pre-school years would be afforded if it were possible to hold clinics annually in each centre.

Pre-School Children

Special efforts are being made to induce parents to have all six-year-olds medically examined before entering school. This affords an opportunity for the correction of any defects found and sends the child to school in a physical condition which permits him taking advantage of the facilities provided for his education.

Health Inspection in Schools

School health work will always claim considerable attention from public health workers. Health inspection of pupils, advice regarding the maintenance of a healthful school plant and assistance with health teaching, are important features of the work and may be carried out successfully since the children are already gathered in groups, thus facilitating the nurse's work. Under a generalized plan the number of schools which it is possible to reach, is much less than under the specialized plan, if the staff of workers remains the same. The number of schools visited in 1929 totals 837 with 28,370 pupils inspected. Health education as carried on in the schools by the teachers, following the instruction given in the Normal schools, forms one of our most valuable instruments for the improvement of personal health. With children in every part of the province developing intelligent attitudes toward health and forming correct habits of health based on adequate knowledge, one feels that the public health problems of the next generation must surely be simpler of solution than those of today. In support of this work the public health nurse supplies health teaching material as posters, plays, rhymes, stories, books, etc., which assist the teacher in maintaining the interest of the pupils. A lending library of health books for children has created considerable interest and has been extensively used during the past year.

Tuberculosis and Trachoma

Follow-up work in cases of tuberculosis, aiming at medical examination of contacts and early treatment of cases found, has been developed as a feature of the work of the nurse. Cases which for some reason require a home visit are reported to us from the sanatoria and from other sources. One hundred and thirty-seven such cases were visited during 1929, several visits frequently being made in connection with one case. Every effort is made to detect suspicious symptoms among the school children and to bring such cases to the attention of the Anti-tuberculosis League, in order to secure medical examination, made possible through the Christmas Seal Sale Fund.

Trachoma supervision is carried on by each nurse as she meets cases in the course of her work, with the exception of one section of the province where a nurse devotes a part of each week to it.

Home-Nursing Instruction

Instruction in simple home nursing for women in organized groups as Homemakers' Clubs, Community Clubs, etc., and for girls of senior school age is given during the winter months, in towns and villages. Eighty senior classes were conducted during 1929 with a total attendance of 2,163 women and 103 junior groups with a total attendance of 3,211. The junior groups are held during school hours, with the permission of the Department of Education, and have been a source of considerable interest for teen-age girls.

Inspection of the small nursing homes throughout the province is another phase of the nurse's efforts, the license to conduct such a home being withheld until the nurse's report is received.

Communicable Disease Prevention

The protection of children of pre-school and school age from diphtheria and smallpox through the use of diphtheria toxoid and smallpox vaccine, is recognized as an important measure in preventive work. Through the nurse, efforts are being made with considerable success, to interest municipal councils in this work of immunization. Arrangements are then made for the doctor chosen to visit the various schools in the municipality. Parents bring children of both pre-school and school age and frequently young adults attend also, to avail themselves of the opportunity which is brought to them, of securing protection from these diseases. In one of the districts in the south of the province the nurse has been successful in having immunization work done in four of her six municipalities, a splendid health service, surely, for these communities.

The work of the public health nurse is not easy. She must be well-trained, experienced, adaptable, tactful and diplomatic, patient and persevering. She needs a keen sense of humour to carry her over many difficult places and a strong physique for the rigours of rural travel. A strong sense of the importance of her work and of the service she is able to give, brings her to the end of the day with a satisfaction in a difficult task well attempted, and at least a step made, toward the goal of all public health effort, as expressed by Sir George Newman—"To defeat disease and to lengthen man's days but still more in the ultimate issue to emancipate the imprisoned splendour of the human spirit".

Epidemic Cerebro-Spinal Meningitis, Brantford, Ontario

W. L. HUTTON, M.D.

Medical Officer of Health, Brantford, Ontario

THIS disease appeared in its epidemic form for the first time in the history of the city on June 11th, 1930. The first case appeared in the home of a family following the visit of a friend from Detroit. As the disease had been prevalent in Detroit, it was thought that this might have been the source of the infection. On June 14th, three additional cases were reported, all being school children at Bellevue school. Following the appearance of these cases, it was deemed wise to order the school closed.

Between July 5th and July 25th, five additional cases were reported. It was noted that all of these cases occurred among young boys whose ages ranged from nine to fourteen years, and that all had been swimming in either the civic swimming pool or the Y.M.C.A. swimming pool. While it is known that the meningococcus, the cause of the disease, cannot live in water, it was strongly suspected that the disease was actually spread from these pools. It is known that the disease is spread through the transfer of secretions of the nose and throat, and common observation strongly suggested that such transfer frequently occurs in all swimming pools. These pools were, consequently, closed for the season on July 25th. This action was apparently justified as, of five additional cases reported within the next eight days, all were young boys who had used one or other of the swimming pools.

Careful investigation of the outbreak was made, including the examination of all contacts of the cases. Nose and throat swabs were taken and cultured on suitable media. Altogether 228 persons were swabbed but the results were almost negative.

The last case reported was on September 11th, making a total of eighteen cases. All of these cases were boys with the exception of one adult, a woman. Fourteen cases were diagnosed as epidemic meningitis while suffering from slight stiffness of the neck or from headache, and before the development of opisthotonos or loss of consciousness. Four cases developed opisthotonos before the correct diagnosis was made. Three of these four had lost consciousness by the time that the diagnosis was made, and the only one of these three which received polyvalent anti-meningococcus serum recovered consciousness within three hours. The other two died before it was possible to administer serum. Thus of the eighteen cases only two died. This gives a remarkably low death rate for this disease, and I attribute this happy result to the early diagnosis by the family physicians, whenever they were called in, including the prompt use of serum, and to the intelligent co-operation of the citizens, who quickly learned to appreciate the significance of the

signs of meningeal irritation—headache and stiff neck. That this death rate was low is apparent when the experience of the city of Detroit is remembered. In Detroit, 867 cases were reported during the year 1929, and 430 of these patients died. In the accompanying table data are presented concerning age, sex, symptoms, length of time elapsing before the reporting of the case, the amount of serum used, route of injection, laboratory confirmation of diagnosis, and result. The serum used was a polyvalent anti-meningococcus serum prepared by the Connaught Laboratories, University of Toronto, and distributed by the Department of Health, Ontario.

During the course of this epidemic two patients were admitted to the local hospital from a neighbouring village, complaining of stiff neck and showing spasticity of the muscles. One case showed a total absence of knee jerk in the right leg. The other showed an impairment of both knee jerks. The temperatures in these two cases ranged from 102°F. to 103°F. Lumbar punctures disclosed the typical picture of anterior poliomyelitis—low cell counts and no organisms. Convalescent serum (anterior poliomyelitis cases), supplied by the Department of Health, Ontario, was administered. Both these cases recovered completely.

EPIDEMIC MENINGITIS, BRANTFORD, ONTARIO, 1930

Date Reported	Age	Sex	Symptoms	Time before reporting case	Amount of Serum	Method of Injection	Result	Laboratory Confirmation	After effects
11/5/30.	10 yrs.	M.	Headache; slight opisthotonos; spinal fluid purulent, pressure +.	3 days	270 cc.	I.S. I.V.	Recovery	No	None
14/5/30.	9 yrs.	M.	Headache and stiff neck.	1 day	300 cc.	I.S. I.V. I.M.	Recovery	Yes	None
14/5/30.	9 yrs.	M.	Vomiting, headache, unconscious with marked opisthotonos, stiff neck and deafness.	3 days	100 cc.	I.S.	Recovery ¹	Yes	Yes*
14/5/30.	17 yrs.	M.	Headache, stiff neck.	None	100 cc.	I.S.	Recovery	Yes	None
5/6/30.	9 yrs.	M.	Diarrhoea, stiff neck.	2 days	180 cc.	I.S. I.V.	Recovery	Yes	None
14/6/30.	12 yrs.	M.	Headache, pain in neck and right hand, vomiting.	1 day	160 cc.	I.S. I.V. I.M.	Recovery	Yes	None
15/6/30.	12 yrs.	M.	Chill, headache, vomiting, became unconscious.	1 day	190 cc.	I.S. I.V. I.M.		Yes	Yes†
23/6/30.	14 yrs.	M.	Vomiting, pain in neck, loss of consciousness,	At once	None		Death	Yes	

EPIDEMIC MENINGITIS, BRANTFORD, ONTARIO, 1930

Date Reported	Age	Sex	Symptoms	Time before reporting case	Amount of Serum	Method of Injection	Result	Laboratory Confirmation	After effects
25/6/30.	13 yrs.	M.	Headache, stiff neck, positive Kernig, loss of consciousness.	At once	100 cc.	I.S.	Recovery	Yes	None
27/6/30.	17 yrs.	M.	Headache, stiff neck.	1 day	100 cc.	I.S.	Recovery	Yes	None
28/6/30.	11 yrs.	M.	Headache, conjunctivitis.	1 day	None		Death	No	
29/6/30.	15 yrs.	M.	Headache, vomiting, pain in neck.	1 day	140 cc.	I.S. I.V. I.M.	Recovery	Yes	None
31/6/30.	12 yrs.	M.	Stiff neck, July 28th. Lumbar puncture negative; positive on July 31st.	2 days	100 cc.	I.S. I.V. I.M.	Recovery	Yes	None
2/7/30.	10 yrs.	M.	Sore throat, headache, stiff neck.	4 days	200 cc.	I.S. I.V. I.M.	Recovery	Yes	None
8/7/30.	10 yrs.	M.	Headache, stiff neck, positive Kernig.	1 day	100 cc.	I.S. I.V. I.M.	Recovery	Yes	None
19/7/30.	40 yrs.	F.	Headache, stiff neck, positive Kernig.	1 day	100 cc.	I.S. I.V. I.M.	Recovery	Yes	None
4/8/30.	20 yrs.	M.	Headache, stiff neck.	1 day	100 cc.	I.S. I.V. I.M.	Recovery	No	None
11/8/30.	4 yrs.	M.	Headache, pain in neck, positive Kernig.	1 day	100 cc.	I.S. I.V. I.M.	Recovery	No	None

¹Within 3 hours recovered consciousness and could answer written questions but not oral questions.

*Permanent deafness. I.S.—Intraspinal. I.V.—Intravenous. I.M.—Intramuscular.

†Rigidity of muscles still present July 23rd.

Summary

Eighteen cases of epidemic meningitis, in fourteen of which the diagnosis was confirmed in the laboratory, and seventeen of which occurred in boys, age nine to twenty years of age, were treated with polyvalent anti-meningococcus serum with recovery in sixteen. The two fatal cases died within twenty-four hours of onset and did not receive serum.

Laboratory Aids in the Diagnosis of Lead Poisoning*

A. R. RIDDELL, M.B., B.A., D.P.H.

Division of Industrial Hygiene, Department of Health, Ontario

BEFORE dealing directly with the subject under consideration, let me briefly direct your attention to certain general points which are worth remembering.

Lead has been produced and used by the human race for many centuries. It is not definitely known if it antedates copper in this respect, but it was certainly known to the ancients and mined by them in many parts of the old world¹. It is probable that lead poisoning coincided with the production of lead, and is, therefore, one of the oldest known diseases associated with occupation. Hippocrates describes a colic to which lead workers were subject. It is believed that several of the old masters, amongst others, Raphael and Michael Angelo, suffered from lead poisoning². They probably contracted this condition as a result of mixing their own paints in which lead compounds were used.

The consumption of lead by industry has increased in recent years very greatly, and increasing numbers of individuals are exposed to the dangers associated with the use of this metal, so that the recognition of early indications of injury is becoming more and more important. The laboratory supplies means of early recognition and makes possible the removal of early cases before serious manifestations appear.

It is not possible to obtain accurate figures on consumption of lead, but figures are available on the production. From these we find that the world production of lead at the commencement of the nineteenth century was under 50,000 tons. In 1926, the production of this metal was 1,603,000 tons¹. These figures suggest the increased industrial importance of lead. They only tell a part of the story, however, as enormous quantities of lead are annually reclaimed, re-treated and used over again.

That lead is widely used in manufacturing processes should be constantly kept in mind by physicians and those responsible for the welfare of industrial workers. Appreciation of this will often be the means of clarifying the diagnosis in troublesome industrial cases.

How Lead Enters the Body

In order to appreciate the laboratory findings in lead poisoning it should be remembered that lead gains entrance to the body by a number of different channels. These vary in importance. Lead, or

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rather lead compounds, may be administered for medical purposes either hypodermically or intravenously. Practically, this avenue is not of importance but it is worth remembering. The three important means of entry to the body are in order of importance—

1. *By way of the respiratory tract.* Lead in the form of dust (generally lead compounds) or fumes, is readily absorbed through the mucous membrane of the upper respiratory tract or through the lung surfaces.
2. *By way of the mouth and gastro-intestinal tract.* Under certain conditions lead is absorbed from the stomach and intestines.
3. *By way of the skin.* This is only important in the case of certain lead compounds, particularly tetra-ethyl lead, or where lead has been applied to broken skin surfaces for therapeutic reasons.

It will be appreciated that lead inhalation constitutes a greater danger than lead ingestion³ because lead is readily absorbed directly into the blood stream from the respiratory surfaces, whereas a large proportion of ingested lead passes through the gastro-intestinal tract and is got rid of in the faeces without entering the body proper at all. Only that ingested lead which is absorbed from the gastro-intestinal tract and reaches the blood stream is capable of producing poisoning.

When lead has been absorbed in any quantities it produces physiological changes which manifest themselves more or less gradually, and eventually constitute lead poisoning. These changes give rise to more or less characteristic symptoms and signs now because these symptoms and signs are frequently less than more characteristic. It is often only possible to establish a reasonably certain diagnosis through the assistance afforded by the laboratory.

Appreciation of the fact that only lead which reaches the blood stream is capable of producing lead poisoning, will indicate to you that the laboratory demonstration of lead in excretions from the body has different values from a diagnostic standpoint. Thus the demonstration of lead in the urine is much more valuable than its demonstration in the faeces. Lead isolated from the faeces of a patient indicates that that patient has been exposed to the possibilities of lead absorption. This lead may, however, never have entered the body proper. On the other hand lead isolated from the urine indicates that lead absorption has actually taken place⁴. The lead in this case has been in the body.

LABORATORY TESTS

A number of laboratory procedures have been applied in connection with the diagnosis of lead poisoning and for the estimation of the degree of damage produced. These are all interesting and are of value in the individual case, but they are not all of equal value. I shall discuss several of these briefly, but wish to stress two in particular because it is felt that without one of these two laboratory procedures the diagnosis of lead poisoning cannot be considered in any way complete. No case

of lead poisoning has been properly investigated unless certain blood investigations have been carried out. Few are complete without an estimation of lead in the urine.

In certain cases of lead poisoning it has been shown that haemato-porphyrin in more or less considerable amounts is present in the urine. This finding may give some information as to the amount of blood destruction. The test requires special apparatus to carry out and is not specific.

The fragility of the red cells in Ringer's solution is increased in lead poisoning. This test also does not assist materially in diagnosis. It may have application in certain cases.

The resistance of "leaded" red cells to hypotonic salt solutions is of considerable value and in experienced hands may give useful information as to the degree of "leading". It is rather easy to apply and with practice may be found of much assistance particularly in connection with industrial control.

The demonstration of lead in the faeces is certainly of interest and value to research workers. It, however, does not assist in diagnosis except that it does prove contact with lead or lead compounds and will, if positive, definitely determine exposure where this is in doubt.

Estimation of Lead in Urine

Determination of pathological quantities of lead in the urine of a patient is always of importance. I say pathological quantities because it has been found that the urine of a large number of civilized persons, at least of city dwellers who are apparently perfectly normal, contain small quantities of lead⁴. Fairhall's⁴ method for determining the amount of lead in the urine is the method of choice. It cannot well be undertaken apart from a fully equipped chemical laboratory having the services of a trained chemist. This estimation is quantitative. Qualitative determinations are of no value. For accurate determination of lead in the urine considerable quantities of urine are required, preferably 1,000 cc., certainly not less than 500 cc. When this test is being carried out a control should be run on an equal quantity of urine from an unexposed individual, and only the lead in excess of that in the control reported as positive. The determination of lead in the urine is of such importance that it should be undertaken in every suggestive case.

Blood Examinations which the Physician may make readily.

The last laboratory method to which I shall direct your attention is blood examination. It is the most important and one that can be undertaken without special equipment, presuming that every physician at the present time has access to a microscope, is able to do an ordinary blood count and stain a blood smear. Blood examination must include a haemoglobin estimation, a red blood count, possibly a white blood count, and the examination of the stained blood smear. The informa-

tion obtainable from the white blood count is not of the importance of that from the other procedures mentioned, although it has been stated that in lead poisoning a relative increase of the mononuclear leucocytes is found. This finding is certainly not sufficiently common to be of much diagnostic assistance. The white blood count does help in ruling out blood changes due to other causes such as benzol poisoning.

The information obtainable from the examination of the stained blood smear is of vital importance when considered with haemoglobin percentage and the red blood count. Attention must be directed to the morphology of the red cells and a search made for the presence of red cells showing basophilic stippling. The general appearance of the smear is that of a secondary anaemia. Thus one finds variations in size and shape of the red cells (anisocytosis and poikilocytosis), variations in staining qualities (polychromatophilia), reticulation, sometimes nucleated reds and with these stippled red cells. These stippled cells are, I feel reasonably certain, always demonstrable in blood from cases of lead poisoning. Where they are not reported in undoubted cases of lead poisoning, they probably have not been looked for, or the stain used has lost its ability to bring them out. The finding of stippled red cells in a smear in numbers above 200 per million reds is of such significance that lead as a factor in their production should be ruled out.

Stippling appears in other conditions. It occurs in pernicious anaemia, in malaria, in leucaemia, in certain pneumonias and some other acute conditions, in internal haemorrhage where the haemoglobin is retained in the body, also in benzol poisoning and after the administration of certain biological preparations such as thyroid extract, but in none of these is it so constantly present and rarely in more than slight amounts.

The technique for the demonstration of stippled red cells is of importance because poorly made slides or improper fixing and staining methods frequently result in a failure to demonstrate them. Smears should be prepared on clean glass slides. The blood should be spread evenly and moderately thin. The smears should be stained without prefixing. It can be shown that prefixing cuts down the number of stippled cells demonstrable⁵. Stippling may be demonstrated by ordinary differential stains such as Wright's, Hastings' or similar stains. In order to bring out the stippling with these stains it may be necessary to make them slightly more alkaline than they are as generally employed. It also may be demonstrated by staining with various methylene blue stains, but that of choice is Unna's alkaline methylene blue. When staining with this stain, the slides are first fixed in methyl alcohol and dried. They are then flooded with a 1:15 dilution of stain and stained for fifteen minutes.

The advantage of polychrome staining is that with a differential stain changes in the morphology of the red cells are more readily appreciated. It has been found by a number of workers that Harlow's stain is satisfactory as it brings out stippling and other characteristics

well. It consists of a one per cent solution of water-soluble eosin and a one per cent solution of medicinal methylene blue in separate bottles. The solvent being absolute methyl alcohol. In order to be successful with this stain the materials used must be the best procurable, and, when the stain is made up, it must be protected from sun light and contamination by the atmosphere.

The staining method is briefly as follows: The unfixed slides are placed in the eosin solution for approximately two minutes. They are then transferred without washing to the bottle containing the methylene blue and allowed to remain there for five minutes. After this they are quickly rinsed in a beaker of, preferably, distilled water, dried and examined under the microscope.

I have mentioned above the diagnostic importance of stippling and other pathological elements in the blood smear, but have said little regarding the value of the haemoglobin estimation and red blood count. Some cases of lead poisoning show considerable anaemia, and, of course, where this is present, valuable information is disclosed as to the severity of the condition, which has a bearing on prognosis, but in probably the majority of leaded persons the facial appearance leads to the conclusion that the anaemia is more profound than is actually the case. Many lead cases show distinct and definite pallor, with only a slight drop in the red cells and haemoglobin. These findings are characteristic of lead poisoning and taken together constitute a valuable sign.

SUMMARY

1. Laboratory methods for diagnosis in lead poisoning are valuable in any case, essential in the majority. They are not in themselves diagnostic but complementary to clinical examination including history.
2. In every case blood examination, including haemoglobin estimation, red blood count and examination of the stained smear should be carried out.
3. Quantitative estimations of lead in the urine should be routine practice.
4. Public institutions such as public health laboratories should be in a position to make these estimations for the general practitioner.
5. In industrial work periodic examination of blood smears stained to demonstrate stippling in the red cells is a convenient and efficient method of checking exposed workers and, with practice, assists the industrial physician to place his staff of workers so as to avoid the more severe manifestations of lead poisoning amongst them.

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Two Typhoid Fever Carriers*

N. H. SUTTON, M.B., D.P.H.

District Medical Officer of Health, Department of Health, Ontario

THE ultimate object at which we aim in the case of this disease is to eliminate the source or reservoir of the infection, or to bring such a source under control so that it shall cease to be a danger. Not very many years ago, the occurrence of typhoid occasioned investigation of the water supply—and little else. In the modern view, the water supply is important, but not more so than many other things. The old water-borne epidemics of typhoid are mostly a thing of the past. Sanitary engineering has, where fully made use of, eliminated such outbreaks. Now-a-days, the outbreaks are more apt to be milk-borne and a single source of infection can cause great damage because the bacilli can multiply in milk, while they do not do so in water. When sanitary engineering is fully applied to milk so that it is all pasteurized scientifically before being sold to the public or made up into dairy products, milk-borne outbreaks will cease. The typhoid problem will then be, largely, that of the individual carrier who infects food or pollutes wells.

An instance of this may be quoted: Last autumn, a farm housewife was brought into a hospital in my district and died there of typhoid fever. Her husband was too ill to attend her funeral and was also brought to the hospital with typhoid from which he recovered. Their physician, who was also medical officer of health of their home municipality, inspected the home and found the well to be down a gentle slope some ten feet distant from the usual type of farm privy. He brought a sample of well water to the laboratory where it showed *B. coli* in 1 cc. Behold! The Source! Several questions were presented. How came the typhoid germs in the privy in the first place—granting for the moment that such was the true road of infection? How long had this well and privy been in that relationship without change? It appeared that they had been in the same position for years. Had any of the household ever had typhoid? Had there been any visitors? Had any of the household been away? None of these questions had received consideration.

On investigation it was found that the household had consisted of the man and wife and the youngest daughter, an adult. They stated that they had not been away visiting nor in other places where they might have been infected; that they had had a cousin helping in harvest, but no other visitors of late. Investigation of the cousin was negative. Any dairy products they had purchased were also negative. So far,

*Paper presented at the joint meeting of the Canadian Public Health Association and Ontario Health Officers' Association, Toronto, May 1930.

I had drawn a blank. In December, a boy was taken to the same hospital from his home in the city, ill with typhoid. On investigation, it was learned that at that time, three weeks before he became ill the family had moved to the city; the frost had got into the house they had taken and split the bowl of the flush closet, so that for two days they had to use a bucket in the cellar. The grandmother was the only member of the household who had ever had typhoid and that, some twenty years ago. In conversation, mention was made of these other cases which had been in the same hospital, and the housewife said, "Why, mother was out there visiting for three weeks just before the woman took sick". So far the germs have not been found in stool or urine of the grandmother, but she is still under observation.

In 1923-4 a questionnaire was sent to physicians in my district whenever a positive Widal was reported from one of their patients. The answers to the question were at times weird, and in the majority of instances, gave as much additional light on the source as moonlight adds to noonday. Not so in all cases, however. One of the most northerly physicians answered all questions on his case quite admirably and filled in the final space for "remarks" thus,—"This lad of 13 got his infection from his grandmother, an old lady of 84 and soon to pass on, thank God, for this is the third case I have traced to her. She left these parts for the city, and I thought we were free of danger from her, but, unknown to me, she returned to visit one of her children and just over three weeks later, this grandchild came down with typhoid. Her history is interesting. She had typhoid when she was 17 years old, recovered well, and nothing further occurred until she was about 55 years old. This is the twelfth case which has been traced to her."

During the last two years, a fairly elaborate, if condensed, form of data sheet or questionnaire form has been in use by the Department, one of these being sent to the physician concerned with every positive Widal report from any of our laboratories. The experience with these forms was much the same as with the previous ones. Now, the practice is to have the District Officer or other member of the Department fill out the data sheet, while conducting the investigation in company with the physician or medical officer of health. At times, it is necessary to add a supplementary report, for it is impossible to devise a data sheet to fit every case or investigation. In this way the physician and local medical officer of health see modern methods in use, and it is anticipated that they will be strengthened in their work.

In conclusion may I make a plea for earlier, more frequent and extensive use of our laboratories and of the facilities which they offer by utilizing blood tube outfits and broth culture outfits, as well as the older Widal slides. This service is invaluable and the use of the newer outfits is essential if we are to make the most of our opportunity.

Dr. John Snow—Anaesthetist and Epidemiologist*

J. L. LITTLE, M.D., D.P.H.

Department of Pathology and Bacteriology, University of Toronto

AT Frith Street, 54, Soho Square, London, Doctor John Snow held consulting chambers, and it is related that the shoes of the ever-ailing public never wore his door-step smooth. Practice was slow in coming, because "he was", as his friend Richardson remarked, "an earnest man with not the least element of quackery in all his composition, with a retiring manner, and a solid scepticism in relation to that routine malpractice which the people love." It was a common observation among the folk in the Square that every morning save Sunday, punctually on the hour, young Doctor Snow would descend into the street and turn in the direction of the Charing Cross Hospital.

He is described as being of medium height, spare frame, dignified bearing, with droll ways, a quiet manner, and sincere, kindly expression. His greetings were undemonstrative but cordial. His wit was original, gentle and refined. If one could combine in a sketch something of an ascetic, a total abstainer, a vegetarian, a bachelor, a lover of children, a devotee of the open heath, and an enthusiast for all things of good report, then we would be presenting John Snow as a man. But that which characterized him as a pioneer in epidemiological science and anaesthesia was his singular gift as an observer, his painstaking industry, and his brilliant logic.

The Fellows of the Westminster Medical Society (now the London Medical Society) recognized him as "a quiet man, very reserved and peculiar, a clever man at bottom perchance, but not easy to be understood and very peculiar." Snow was always grateful for the help he received by attending and taking part in the discussion at the Society's proceedings. In later years, when he had been honoured with the presidency of that body, he delighted to recall the heart-throb which he had felt when he, as a young man, had been referred to by some grave councillor as "the last speaker"; then on another occasion how someone had been bold enough to name the "last speaker", and finally how that someone had even had the temerity to agree with Doctor Snow.

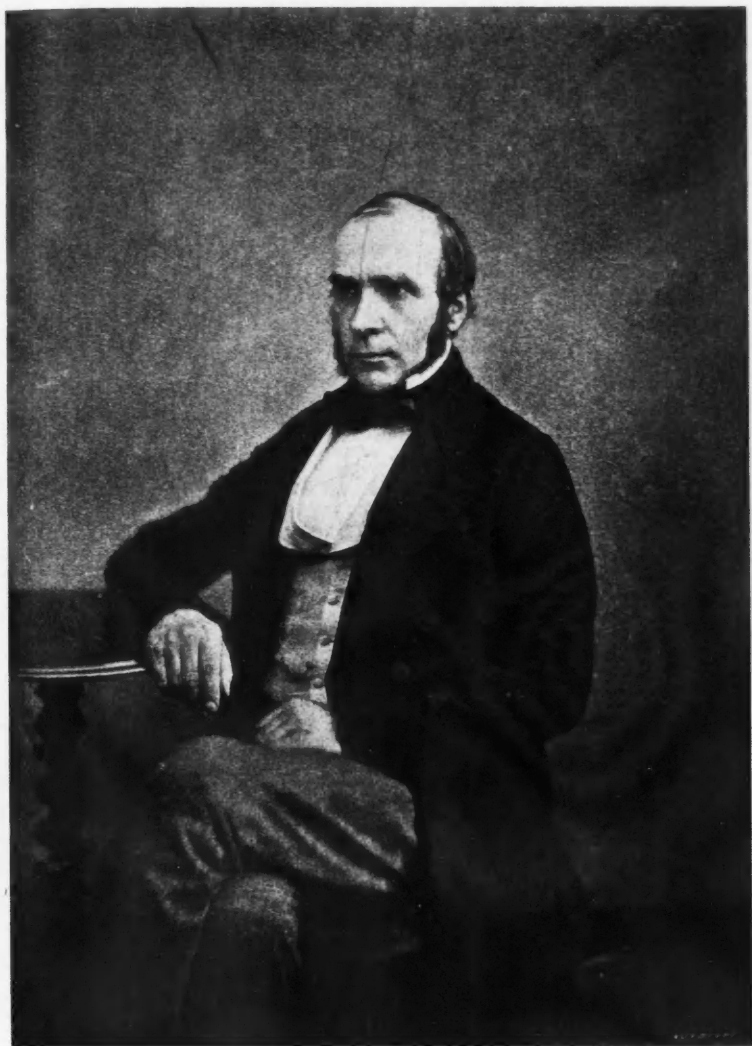
In 1846, news of the discovery of ether crossed the Atlantic. A demonstration was arranged in London. It was suggested that under the spell of this new drug, surgical operations might safely be performed. Snow's enquiring mind was aroused. He devised a new

*The first of several short historical articles which will be published in the Journal during this year.

inhaler, and investigated the best methods of administration of the drug. After having thoroughly tested his experiments and theories on animals, he tried the results on himself. He secured permission to administer ether at St. George's Hospital Out-Patients quarters, and later at University Hospital. His administration was so skilful that he attracted the attention of Mr. Liston, Mr. Cutler, and Mr. Ferguson, the three most popular operating surgeons in London. He summarized his work and experience with the new drug in a short book which was just beginning to bring him into fame when Simpson introduced his "nodynia" or chloroform. Snow had so well-balanced a mind that, instead of jealously striving to keep ether in the public attention, he immediately set about to master the niceties of administering the new chloroform, and so well did he achieve his object that he was selected as anaesthetist to the Queen. At the birth of Princess Beatrice, Her Majesty was anaesthetized for fifty-three minutes, and proved herself as Dr. Snow remarked, "a model patient".

His chief title to fame, however, is the work he did in unravelling the mystery of the transmission of cholera poison. As early as 1848, thirty-five years prior to the epochal discovery of the cholera vibrio by Koch, and before micro-organisms were discovered to be among the causative agents in disease, Dr. John Snow had solved the problem of control of this dread scourge. His observation had forced him to conclude that the cholera virus was taken directly into the gastrointestinal tract from poison excreted by those already suffering from the disease. During the great epidemic he gave up practice in large measure to devote himself further to the solution of the problem. Morbid material was widespread. Richardson writes, "No one but those who knew him intimately can conceive how he laboured, at what cost, and at what risk. Wherever cholera was visitant, there was he in the midst." The result of his endeavours in so far as scientific satisfaction is a realization, was truly realized in the discovery of the statistical fact, that of 286 fatal attacks of cholera in 1854, occurring in the south districts of the metropolis, where one water company, the Southwark and Vauxhall, supplied water charged with the faecal impurities of London and another company, the Lambeth, supplied a pure water, the proportion of fatal cases to each ten thousand houses was to Southwark and Vauxhall water 71, to the Lambeth 5. It is to Snow alone that we must credit the conception that cholera is a disease communicated by contaminated drinking water. The Second Edition of his greatly enlarged monograph, "On the Mode of Communication of Cholera", showed in the most conclusive fashion how the disease was to be prevented by the memorable object lesson of the Broad Street pump—when the plague was instantly stayed by removing the handle of the pump.

His oration delivered to the London Medical Society, "On Continuous Molecular Changes" is a veritable compendium of epidemio-



John Snow

(Autotype from a Presentation Portrait, 1856, and Autograph facsimile.—Benjamin Ward Richardson).

logical forecasts. Although it was not until 1879 that Sir Patrick Manson demonstrated the development of malaria outside the body, read what John Snow said in 1853: "Whether the unknown cause of ague has been produced in the system of a previous patient, like the pus of smallpox, or the eggs of tapeworm, or whether it has been produced externally, there is, at present, no evidence to show. If there is one circumstance which seems to indicate that the specific cause of intermittent fevers undergoes a development or multiplication within the system of the patient, it is that a period of dormancy or incubation has been observed, in many cases between the visit to the unhealthy locality and the illness which followed; for as I have already remarked every poisonous or injurious substance causes symptoms as soon as it has been absorbed in sufficient quantity. Supposing ague to be communicable, it may be so only indirectly, for the *materies morbi* eliminated from one patient may require to undergo a process of development or precreation out of the body before it enters another patient like certain flukes infecting some of the lower animals."

Measles was not in any sense a plague, according to Snow, for he remarks: "It is not improbable that the specific cause of influenza and measles is drawn in with the breath as these diseases effect chiefly the respiratory organs and spread equally amongst all classes of the community." One can imagine with what interest Snow would have discussed with Ludwig Panum the latter's investigation of the epidemic of measles in the Faroe Islands some seven years previously. Here is another specimen of his pithy observations as recorded in his Oration referred to above, "With respect to the prevention of communication of disease, it is worthy to remark that there are two diseases whose mode of propagation is well known to almost everybody, and almost everybody has it in his power to avoid them—I allude to syphilis and the itch."

His notes teem with interest. He kept a diary in which he recorded the particulars of every case in which he administered chloroform or other anaesthetic, with comments on the results of the administration, and hints as to dangers avoided or chanced. He kept a record of all his experiments and short notes of observations made by his friends. He rose early, and retired early to rest—at eleven o'clock. He had always been an industrious methodical worker from his early apprentice days.

Snow was born in York, June 15th, 1813. He was graduated M.D. by the University of London 1844. The London Medical Society in

Through the kindness of Mr. I. H. Cameron, Emeritus Professor of Surgery, University of Toronto, a copy of the autographed presentation portrait of John Snow (1856) was made available for reproduction in the *Journal*. The autotype and autograph facsimile were made by Sir Benjamin Ward Richardson and for the copy here used, Mr. Cameron is indebted to Mr. Donald J. Armour, B.A., M.B. (Tor.), F.R.C.S., London, England.

1853 honoured him with the presidency. On the morning of June 9th, 1858, while engaged on the manuscript of his last book, "On Chloroform and Other Anaesthetics", he was suddenly stricken with paralysis and died that same afternoon. His body rests in Brompton Cemetery. His epidemiological ideas will never be buried. In worthy recognition of his singular contribution to scientific method, his name has been carved on the facade of the new School of Hygiene and Tropical Medicine in London, along with the names of many better known worthies but few more deserving of the honour.

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**NATIONAL HEALTH INSURANCE MEDICAL SERVICE,
GREAT BRITAIN**

"For good or evil, National Insurance is part of the social system of nearly every country in Europe, and from a pretty intimate knowledge of the systems in other countries I believe ours is the best, so far as the conditions under which the doctors are employed are concerned. Unless I am much mistaken it will not be very long before Canada and probably the United States follow the example of the countries in Europe in instituting a Sickness Insurance system for people who cannot pay for medical attendance as private patients. If and when Canada does adopt such a system you will find that regulations and disciplinary measures are necessary, not for the great bulk of the profession, who are honest, conscientious practitioners, but for that small minority which always lets us down in the eyes of the public. I hope the *Bulletin* will not take its views on Health Insurance from either lay or medical writers with an anti-Insurance bias. I feel sure that not 5 per cent of the doctors working our insurance system or of their patients would go back to the old conditions if they had the chance."

From a letter by Dr. Alfred Cox, Medical Secretary, British Medical Association, published in the January issue (1931) of the Manitoba Medical Bulletin in reply to a letter by Lord Riddell, criticising the position of the medical profession in Great Britain under the terms of the National Health Insurance Medical Service.

Editorials

TWO BAD HABITS

VISCOUNT CECIL is reported to have said recently that \$10,000,000 is spent daily, at the present time, by the various countries of the world for purposes related to war. Startling, it is, if true. In any event, sensible people are agreed that this world would be a better place in which to live if we were not constantly preparing to prematurely and precipitately pitchfork one another into the next.

Another aspect of this question might be illuminated if we had set before us the cost in human lives sacrificed in war during the past sixty years, divided by sixty, so that even the simplest and humblest among us could realize the significance of the figure arrived at.

What advantages accrue to mankind if Preventive Medicine saves some thousands of lives annually so that the insensate butchery of war may in a few short years offset all the gains of half a century of self-sacrificing toil and splendid endeavour? Must the people of the world endure further wholesale slaughter before they truly learn to feel and to know that war is a bad habit?

Preventive Medicine has no other task more important and perhaps more difficult than that of assisting in the promotion of international understanding and goodwill. We have countless opportunities of sharing in such efforts. Let us extend and amplify them by every possible means. Neither war nor pestilence is desirable nor inevitable. War is our No. 1 Bad Habit!

There is a quaint notion rather widely held at present that a breathing spell is urgently needed to enable us to apply what we now know. The implication being, of course, that we have, for the moment, sufficient knowledge but insufficient application. This idea is the basis of another very bad habit—being satisfied with ignorance or half-truths. We really do not know everything about anything, deeply as we may cherish notions to the contrary.

This is a most insidious bad habit. It leads us into taking for granted all sorts of absurdities and stupidities. We cannot all be wise and profound but most of us can, it is to be hoped, exercise common sense at least part of the time. This particular bad habit—not, of course, peculiar to Preventive Medicine—may be combatted by vigorous and wholesome attacks upon the great gaps in our knowledge of how best to promote the mental and physical health of human kind.

And so we first ponder the reality of these bad habits and then we set about our efforts to correct or cure them. Very likely many of us

will begin by indulging in a liberal dose of mental catharsis followed by repeated resort to the principles of mental hygiene. Not to the extent, however, that we will, in the end, be compelled to admit that we have left undone those things which we ought to have done, in the domain of physical welfare.

Preventive Medicine has her great opportunities. Will her practitioners measure up to them?

J. G. FitzGerald

COUNTY HEALTH UNITS

THE County Health Unit movement in Canada is an important issue and this will continue to be the case. While individual units were formed in Quebec and British Columbia five years ago and while the rapid strides made in the Province of Quebec have attracted a great deal of attention, perhaps the motion proposed by Mr. Henry Spencer, Member of Parliament for Battle River, in the House of Commons, last March, has been especially responsible for attracting public attention to this question of national importance. Mr. Spencer's motion as readers of the CANADIAN PUBLIC HEALTH JOURNAL will remember was to the effect that the Dominion Government consider participation in the movement for the promotion of rural health by providing financial co-operation as in the case of the already successful Venereal Disease control scheme.

It is not without interest to note that while the opinion that health is to a degree a federal responsibility has been growing in Canada, at the same time the same issue is receiving recognition in the United States. President Hoover in an address to Congress has suggested that health conservation should be as fully organized and as fully incorporated in the governmental system of the country as is education. Furthermore President Hoover in the same address, referring specifically to County Health Units, suggests that the Federal Government actively interest itself in the promotion of rural health and that federal funds be utilized to this end.

The proposal of the President of the United States that health should be considered as on a par with education suggests to one a comparison of the relative amounts of money spent on these two branches of Government activities. The contrasts are startling especially when one considers the situation in rural areas. For example, in one large and prosperous county in Ontario the annual expenditure on education is \$12.50 per head of the population. The per capita cost of official health conservation machinery in the same area is exactly nineteen cents. Equally surprising is the comparison of the expenditures on health in rural and urban areas. On the whole the health machinery in the larger urban centres is much more effective than in the country, although there are some smaller urban centres in which expenditures on health are deplorably small. One has in mind a city with a population of approximately 18,000 in which the total annual health budget

involves a tax of only one cent per head of the population. The results in terms of death rates and disability rates are, of course, as tragic as might be expected. Generally speaking, however, it is recognized that the great problem both in Canada and the United States is that of rural health.

Great progress has been made in the development of public opinion to the end that rural health may be recognized as a national problem worthy of the earnest attention of legislators both federal and provincial. It is hoped that shortly in all the provinces of Canada legislation may be enacted making the development of County Health Units possible but it is most important that the Dominion Government undertake its full share of responsibility. Without real Dominion leadership, and of course this involves financial participation, the development of rural health will lag and the rural population of Canada will continue to be without the essential advantages which should be their right.

Gordon A. Bates

FORMATION OF THE NEW SECTION OF PUBLIC HEALTH ENGINEERING

THE control of the environment takes us at once into the engineering field. Given the underlying biological data, it is the province of the engineer to design, construct and operate the works necessary for the desired control. Public water supplies, milk and other food supplies are readily subjected to public control which can be made thorough, efficient and economical. In this supervision the engineer plays a leading part. Thus, public health engineering may be defined best as the art of directing the forces and activities of nature to the protection and improvement of public health.

For a number of years the need has been felt for a definite section of the Association to be devoted to Public Health Engineering. As a result of the expressed desire of a large and very representative group of engineers, the Association has approved of the formation of this new section.

For the first year the officers of the Association are as follows: Honorary Chairman, Dr. W. J. Bell, Deputy Minister of Health, Ontario; Chairman, G. H. Ferguson, B.A.Sc., Dept. of Pensions and National Health, Ottawa; Vice-Chairman and Secretary, A. E. Berry, M.A.Sc., C.E., Ph.D., Parliament Bldgs., Toronto. The plans for the Section including details of membership and appointment of committees will be presented at the first meeting of the Section, which will be held at Regina in June in the course of the Annual Meeting of the Association.

There is every reason to believe that the new section will prove a source of real strength to the Association in its work of advancing public health in Canada.

G. H. Ferguson.

The Hon. Dr. George H. Murphy

Nova Scotia's First Minister of Health



HON. DR. GEORGE H. MURPHY,
Minister of Health, Nova Scotia

WITH the appointment of the Honourable Dr. George H. Murphy as first Minister of Health, Nova Scotia becomes the sixth province in Canada to bring the many activities of Government, related to public health, under the direction of one official head, thus affording the opportunity for the constant expression of the urgent health needs of the province in Cabinet conference.

In the selection of Dr. Murphy, Nova Scotia has been most fortunate. Few men entering public life have been accorded a more generous expression of good-will by the profession and public alike. Dr. Murphy graduated in medicine from Dalhousie University in 1902 and for many years he has been a member of of the surgical staff of the Victoria General Hospital, Halifax.

For the past fifteen years he has been Associate Professor of Clinical Surgery at Dalhousie University. He is a Fellow and an Ex-Regent of the American College of Surgeons; a Fellow of the Royal College of Physicians and Surgeons of Canada and Past President of both the Provincial Medical Association of Nova Scotia and of the Medical Society of Halifax.

The profession of Nova Scotia have voiced their appreciation of Dr. Murphy and his appointment, and in these words the Nova Scotia Medical Bulletin welcomes the new Minister. "The future looks bright because there has never been within our recollection a Minister of the Crown who will receive more assistance unhampered by political bias from his professional associates, than is the case in the appointment of Dr. George H. Murphy of Halifax to this honourable and onerous position." The Canadian Public Health Association joins most heartily in these greetings and good wishes to Dr. Murphy.

LABORATORY SECTION

G. B. REED, PH.D.; A. L. McNABB, D.V.Sc.

A Rapid Method of Typing Pneumococci

M. H. BROWN, M.D.

Research Associate, Connaught Laboratories, University of Toronto

AS early as 1902, Neufeld demonstrated that when pneumococci and serum from animals previously inoculated with a homologous strain were mixed and examined under the microscope, agglutination was seen to occur. More recently Sabin has made certain modifications of this procedure so that now a rapid and very reliable method is available. The procedure is as follows:

(1) A representative sample of sputum should be obtained, if necessary, waiting until the patient expectorates material directly from the bronchial tract instead of saliva or pharyngeal secretions. A surprisingly small amount of actual sputum is necessary. The sample should be obtained in a clean sterile container, free from any preservative.

(2) Wash the sputum at least three times by swirling the mass of sputum around in sterile saline contained in three separate Petri dishes. This tends to remove extraneous microorganisms. Following this, the sputum is thoroughly emulsified in saline, and in order to facilitate this, a 5 cc. syringe and a needle of large calibre are very useful. At least 1 cc. of emulsified sputum is then injected

intraperitoneally into a mouse, using a needle of small calibre. As a matter of routine, two mice are injected.

(3) In three hours a peritoneal puncture is performed, using a capillary pipette made by drawing out a piece of small glass tubing in a flame. The finer the pipette, the more satisfactory it is for this purpose. Grasp the mouse by the loose skin of the neck between the thumb and index finger, with the back of the mouse across the palmar surface of the hand, and made secure by looping the tail between the ring and little finger. The abdomen of the mouse being thus well exposed, the capillary pipette is passed into the peritoneal cavity, and by capillary traction fluid will be seen extending into the pipette. The pipette is then removed and the mouse is kept for further observation.

(4) The surface of a well-cleaned glass slide is divided into four sections, using a glass-pencil. On each of these four sections a small drop of the peritoneal exudate from the pipette is placed. One of the four drops of exudate is mixed with a drop of saline, and is then spread thinly and allowed to dry. To another of the four drops of exudate, a drop of Type I agglutinin serum diluted 1 in 10

is added and the mixture is spread thinly and allowed to dry. Similarly, the third drop of exudate is mixed with a drop of Type II agglutinin serum, diluted 1 in 10, and is spread thinly and allowed to dry, and to the last drop of exudate a drop of Type III agglutinin serum, diluted 1 in 5, is added and the mixture is spread thinly and allowed to dry. The films are then fixed by passing the slide two or three times over a moderate flame. (For convenience one usually labels each of the above four sections as Sal., I, II, III with red pencil.)

(5) The slide is then stained for one minute with basic fuchsin stain. The stain, which should be fresh, is made by adding 10 cc. of a saturated alcoholic solution of basic fuchsin to 90 cc. of distilled water, and filtering through paper. (The saturated alcoholic solution is made by adding 10 g. of basic fuchsin to 100 cc. of absolute alcohol.) Other stains such as methyl violet may be used, but basic fuchsin has been found to be the most satisfactory. Wash off the stain gently with water, blot dry and examine under an oil immersion lens. The saline suspension is examined first and serves as a control. The character of the micro-organisms is then determined. Frequently a pure culture of a lance-shaped diplococcus is found. The other sections are examined in sequence, and definite clumping of lance-shaped diplococci in one of the sections serves to denote the type. There may be many clumps consisting of only a few organisms or a few large clumps covering several microscopic fields. In examining for clumps one should not be misled by micro-organisms, such

as gram-negative cocci. These may be distinguished by being round or coccoid in shape in contrast to the lance-shaped diplococcus of pneumonia. The so-called capsule may be quite marked, especially in animal exudates such as obtained from the peritoneum of the mouse. Type III pneumococci usually show very marked capsules, often so much so that the organisms themselves are seen with difficulty and the clumps are not usually packed as tightly together as are Type I or Type II organisms. Further, in a clump of Type III pneumococci one may see a very fine thread-like matrix extending from organism to organism.

Usually the sputum is well digested in the peritoneal cavity of the mouse within three hours, especially in Type III cases, but occasionally one may be required to repeat the peritoneal puncture after a lapse of four or even six hours in order to obtain a satisfactory result. In our experience a sputum in which a satisfactory typing was not obtained after six hours was either free of a fixed type of pneumococcus or contained some other organism such as a streptococcus.

(6) The mouse almost invariably survives the peritoneal puncture, but, if the organism is virulent, the mouse dies in from 18 to 24 hours. The peritoneum is then opened under aseptic precautions and the contents are washed out with 3 to 4 cc. of saline. The washings are centrifuged, first at very low speed in order to throw down any blood cells. The supernatant fluid is drawn off and centrifuged at high speed to throw down the micro-organisms.

A "ring test" is performed by floating a 1-10 dilution of agglutinat-

ing serum over an equal quantity of the supernatant. At the point of contact of serum and fluid a fluffy white ring appears almost immediately in the tube containing the serum of the corresponding type. The standard macroscopic agglutination test may be made with the centrifuged sediment. The latter two tests serve as a check on the rapid method, but in our experience the "ring test" is the more satisfactory. A broth culture may be made from the heart's blood of the mouse for purposes of further examination, and usually a pure culture

of pneumococcus is obtained from this source.

In a very early case of pneumonia, the first strain isolated may not be one of the fixed types so that it is often advisable to obtain another sample of sputum and repeat the search. In this way a Type I, II, or III, which otherwise would have been missed, may be obtained.

The rapid method of typing may be used satisfactorily in the examination of spinal fluid, pleural exudate or blood culture, but with these one should exercise care in staining so as not to wash off the material.

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA*
BY PROVINCES—JANUARY, 1931

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria....	4	26	50	197	357	56	9	23	43
Scarlet Fever..	2	61	47	362	1041	87	62	50	103
Measles.....	19	5	31	175	159	67	262	45	26
Whooping Cough.....	—	21	—	168	361	108	25	7	183
German Measles....	—	—	—	14	74	†	7	10	2
Mumps.....	1	11	—	236	790	369	20	90	164
Smallpox.....	—	—	—	1	47	1	18	7	3
Cerebrospinal Meningitis..	—	4	—	5	6	—	1	1	4
Anterior Poliomyelitis	—	—	—	—	2	—	—	—	1
Typhoid Fever	—	—	1	37	34	13	1	2	7

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

†Not reportable.

MEMBERSHIP IN THE LABORATORY SECTION

Dr. G. B. Reed, Department of Bacteriology, Queen's University, Chairman of the Section, or Dr. A. L. McNabb, Department of Health, Ontario, Parliament Buildings, Toronto, Secretary, will be pleased to receive applications for section membership from any who are not already on the roll of the Section. The purposes of the Section are (1) to provide an annual meeting for the presentation and discussion of problems, at which representatives from all parts of Canada may be in attendance. (2) By the appointment of committees to formulate "standard methods", etc. (3) To provide the opportunity for the publication of scientific articles in the Association's Journal.

NEWS AND COMMENTS

P. A. T. SNEATH, M.D., D.P.H.

Bilingual Child Welfare Conference at Quebec

ON February 23rd, 24th and 25th, the Canadian Council on Child and Family Welfare, held at the Chateau Frontenac, Quebec City, a unique conference which may be described as the first national bilingual conference to be held in Canada. Each speaker used his own language, but the addresses had been previously translated and copies were distributed so that all might clearly follow the speaker. Interpreters were provided for those taking part in the discussion.

The first day of the Conference was devoted entirely to child health problems. Dr. Helen MacMurchy of the Department of National Health, Ottawa, was the opening speaker. In the afternoon an address was given by Miss Elizabeth Smellie, Chief Superintendent of the Victorian Order of Nurses. In the evening Professor John Fraser of McGill University, spoke on "Maternal Mortality", and Dr. Leblond of Laval University, on "Pasteurization". Other sessions were devoted to child protection and delinquency.

The Conference was closed with a banquet presided over by Dr. Alphonse Lessard, Director of the Provincial Bureau of Quebec, at which Dr. Edouard Montpetit, Secretary of the University of Montreal, spoke on "The Protection of the Child—The Protection of the Nation."

Appointment of Dr. S. Pritchard

DR. S. PRITCHARD, who for the past few years has been the Director of the Chest Department of the Battle Creek Sanatorium, Battle Creek, Michigan, has been appointed Director of the W. K. Kellogg Foundation for Research in Diseases of Children and for the Advancement of Child Welfare. Dr. Prit-

chard is a Canadian and is internationally known as an authority on pulmonary diseases.

State and Provincial Health Authorities' Meeting

A CONFERENCE of the State and Provincial Health Authorities of North America will be held in Washington, D.C., April 29th and 30th.

British Columbia

A SHORT, intensive, post-graduate course in tuberculosis work, with particular attention to treatment, has been arranged by Dr. A. D. Lapp, Medical Superintendent of Tranquille Sanatorium. The course is limited to ten members of the medical profession in British Columbia.

Alberta

DR. A. C. MCGUGAN has been appointed Director of Division of Communicable Diseases, Provincial Department of Health, Alberta.

During the winter bi-monthly health talks have been given over the University of Alberta radio station, CKUA, under the direction of the Department of Health of Alberta. The talks have covered such topics as "Health Dividends", "Pre-Natal Hygiene", "Child Hygiene", "Communicable Diseases", "Cancer", and "Mental Hygiene". On March 4th, Dr. A. C. McGugan spoke on the "Health of the School Child", and on March 20th, the "Prevention of Tuberculosis", will be presented by a member of the medical staff from the Central Alberta Sanatorium.

Saskatchewan

A DELEGATION representing the urban municipalities waited on the Government on January 30th, asking for an amendment to the Tuberculosis Sanatoria and Hospital Act.

They offered four suggestions for the consideration of the Government as possible changes in the financing plans. Included in these was the suggestion that the whole cost of operating sanatoria be a direct charge on the general revenues. An additional suggestion offered was that the Anti-Tuberculosis League be allowed the usual 50 cents per day paid to all general hospitals in the Province in addition to the special grant of \$1.00 per day.

Manitoba

THE Annual Report of the Department of Health and Public Welfare, has just been tabled in the Legislature, which is now in Session in the Province of Manitoba. A new departure has been made in the preparation of this report. In previous years the report only referred to work done during the preceding fiscal year, ending April 30th; this year's report sets forth the activities of the Division of Disease Prevention, including venereal diseases, up to the end of the calendar year. It is felt that in this manner statistics will be available much sooner than under the ordinary course of events. It is hoped that in next year's report the Division of Vital Statistics will be able to arrange to have their statistical tables prepared up to the end of the current calendar year.

A committee, consisting of five nominees of the College of Physicians and Surgeons and four nominees of the Manitoba Medical Association and known as the Committee on Medical Services in Manitoba, have undertaken a thorough survey of the following current problems facing the profession: the costs of medical care, the distribution of physicians amongst the provincial population, state health insurance, voluntary health insurance, costs of medical education, and nursing services.

Mr. E. M. Wood, Deputy Municipal

Commissioner of Manitoba, has resigned after serving the Province for over forty years. Mr. Murray Fisher, K.C., has been appointed as Deputy Minister of Municipal Affairs to succeed Mr. Wood.

Ontario

DURING the week of March 23rd "Health Week" will be observed by the Toronto Social Hygiene Council. A large exhibition will be held at the headquarters of the Council, 40 Elm Street, Toronto, and a series of addresses will be given by eminent physicians. Mayor Stewart has expressed his hearty approval of the plan and is proclaiming a Civic Health Week.

Quebec

MONTREAL has now 32 centres for the free administration of diphtheria toxoid, and, in addition, the Fédération d'Hygiène Infantile provides excellent facilities. These centres are open one day each week from 3 to 5 p.m. Each vaccinated child showing a negative Schick test receives a certificate. Last March arrangements were completed with the Catholic and Protestant school authorities to conduct diphtheria immunization work in the schools, and as a result, a large number of children have received the protective treatment since the opening of the schools in September. Thirty-seven thousand eight hundred and twenty-three children have received toxoid, — 12,290 receiving the first dose, 9,168, the second, and 7,898 the third.

Nova Scotia

IT is expected that the new Halifax Infirmary will be ready for occupancy early in 1932. The Infirmary, which promises to be a very modern and fully equipped one, is designed to accommodate 150 patients and is to cost approximately a million dollars.

OBITUARY

DR. CHAS. J. O. HASTINGS

Medical Officer of Health, Toronto, 1910-29

DR. CHARLES JOHN OLIVER HASTINGS, for nineteen years medical officer of health for the city of Toronto, died at his home in that city on the 17th of January last, after a long and distressing illness.

Dr. Hastings was of pioneer stock, his father having come from the north of Ireland. He was educated at the public schools of his native county of York, at the Hamilton Collegiate Institute, the University of Toronto, and enjoyed post-graduate training in London, Dublin and Edinburgh.

After spending a generation in private practice he became medical officer of health for Toronto in 1910, at a time when resolute administration of the city's health affairs was urgently needed. It was a meeting of opportunity, and the man, and Hastings, because of his high courage, genial good humour great fund of common sense, to which were added a dominating personality, was peculiarly fitted to meet the opportunity.

Practical elimination of typhoid fever through treatment of the water supply, reduction of the general death-rate and of the infant mortality rate, rigid inspection of the milk supply, prevention of disease through scientific pasteurization, medical inspection of school children by the health department—are a few of the accomplishments that mark the highway of his great achievements.

Under Dr. Hastings' direction, Toronto's health department gained an international reputation, attracting visitors from all over the world. When he retired in 1929, the appropriation for public health was about a million dollars a year, the per capita expenditure being the highest for any municipality in Canada.

Dr. Hastings was a Senator of the University of Toronto for many years, president of the Academy of Medicine, of the Aesculapian Club, of the Ontario Medical Association, and of both the Canadian and American Public Health Associations. He was a ready speaker and an indefatigable writer on public health topics. He was honoured with the degree of LL.D. by the University of Toronto some years ago.

Shortly before his retirement, his friends subscribed funds for his portrait which now hangs in the City Hall, and at the same time an endowment fund for \$10,000 was subscribed for the Hastings' scholarship in Public Health at the University of Toronto.

Dr. Hastings is survived by his wife, two sons and a daughter and by five grand-children.

It may well be said of him that he was a devoted public servant who spent his life, with untiring energy, in the cause of humanity.

John W. S. McCullough

Books and Reports

D. T. FRASER, B.A., M.B., D.P.H.; R. R. McCLENAHAN, B.A., M.B., D.P.H.

Civilization and the Cripple. —

By Frederick Watson. Publishers, John Bale, Sons and Danielson, Limited, 83-91, Great Titchfield Street, London W, 1. Thirty-four illustrations and map. Price 10/6 net.

The author presents in a very readable form a broad review of the problem of the cripple, be he child or adult, and his training and encouragement to the point of economic independence. The subject is many-sided. These people must be found, treated, educated in many cases, trained to a trade suited to their infirmity, and, what is often most difficult of all, jobs found for them. It is stressed that persuasion and the offering of an incentive are most important. The author is convinced that nation-wide voluntary organizations, assisted if need be by state grants, are best suited to the work. Although most of the discussion has to do with questions of general policy and the scope of the work, yet many specific examples are given of what can be done. Most of these are chosen from work going on in England and include reference to county orthopaedic associations, Papworth Village Settlement, etc. One chapter is devoted to the American rehabilitation scheme. Although we may hope through advances in preventive medicine to reduce the amount of crippling disease, yet to balance this there is the ever-increasing mechanisation of our surroundings which is bound to bring in its train an increase in the amount of crippling due to accident. The author points out that these individuals should not

be given a lump sum and allowed to go their own ways, as this so often leads to their becoming social derelicts. Much can be done to return them to usefulness and self-respect. Mr. Watson has contributed a most illuminating discussion of these problems.

D. W. C.

Getting Well and Staying Well—

By John Potts, M.D., Fort Worth, Texas, with an introduction by J. B. McKnight, M.D., Superintendent and Medical Director, Texas State Tuberculosis Sanatorium. C. V. Mosby Company, St. Louis, Mo. Canadian Agents, McAinsh & Co., Ltd., Toronto, 221 pages. Price \$2.00.

This is the second edition of the work and is written in simple language and deals with that aspect of tuberculosis confronting chiefly the patient as well as the public health nurse and the doctor. The early part deals with the patient's personal experience, when diagnosed as tuberculous, accepting the diagnosis and following a daily routine which is very vividly outlined. The remaining chapters have to do with the "staying well" stage of a tuberculous patient and contains many pertinent points in this important phase of the disease.

As a book written chiefly as a guide to the tuberculous patient, it ranks very highly with the many recently published ones, being very interesting reading, based, one would say, on long and intimate experience with the tuberculous. A work to be recommended to the recently diagnosed case.

M. H. B.

CURRENT HEALTH LITERATURE

These brief abstracts are intended to direct attention to some articles in various journals which have been published during the preceding month. The Secretary of the Editorial Board is pleased to mail any of the journals referred to so that the abstracted article may be read in its entirety. No charge is made for this service. Prompt return (within three days) is requested in order that the journals may be available to other readers.

Use of Tetanus Anatoxin in the Protection of Horses Against Tetanus—Ramon has established the value of tetanus anatoxin (toxoid) for the active immunization of man and certain lower animals. This paper from the Army Medical Research Board, Bureau of Science, Manila, records an investigation of its value in protecting horses and mules.

REYNOLDS, SIMMONS and ST. JOHN, Philippine J. Sc., v. 43, No. 4 (Dec.), pp. 611-625.

Incomplete Dilatation of the Lungs as a Factor in Neonatal Mortality—"Every maternity hospital should be equipped with at least a simple inhalator for the new born. For deliveries outside of hospitals, the city health departments should provide simple infant inhalators to be rented for the cost merely of the oxygen and carbon dioxide consumed. After a reasonable period of education a legal requirement similar to that for the prophylaxis of blindness should be established."

HENDERSON, YANDELL, J.A.M.A., v. 96, No. 7 (Feb. 14), p. 495-499.

Training and Employment of Midwives—The Central Midwives' Board require as a minimum,—witnessing ten labours, conducting 20 labours personally, of which five must be attended in the patients' homes, and attending a course of thirty lectures. A discussion of the earnings

of practising midwives, the supply of midwives in the light of the recommendations of the Committee of the Ministry of Health for an extension of the period of training, and the organization of a general midwifery service for the country.

SPENCE, J. E., J. Roy. San. Inst., v. LI, No. 8 (Feb.), pp. 487-492.

Review of the Stillbirth Problem in the United States—In the United States this problem is one of greater magnitude than that of neonatal death. In the 7-year period, 1922-1928, the stillbirths from the toxæmias of pregnancy have risen slightly, those from the complications of labour have fallen only very slightly, and those from syphilis do not appear to have changed significantly.

STERLING, E. B., Pub. Health Rep., v. 46, No. 5 (Jan. 30), pp. 207-213.

Tuberculisations and Tuberculosis in Children Under Urban Conditions with Special Reference to "Contacts"—A study of the subsequent histories of a number of children previously examined, including contacts of cases, through childhood to adolescence in the county borough of Newport and an adjacent mining district in Wales including the findings of the tuberculin reaction and a discussion of infection and disease in relation to age, emphasizing particularly the danger period of adolescence.

"Of 120 contacts deemed healthy when first examined, seven have already developed tuberculosis. Six of these occurred during adolescence and as many of these contacts have still to live through adolescence, the telling cannot be considered complete."

MATTHEWS, R. J., M.D., Tubercle, v. XII, No. 5 (Feb.), pp. 193-203.

Outbreak of Paratyphoid in Essex—Between Feb. 1st and 14th, 1931, 172 cases of paratyphoid B. infection occurred in Essex, England, with four deaths. The milk was infected at a dairy farm by an employee suffering from a mild attack. The cases occurred in the surrounding districts. The milk was unpasteurized.

The Medical Officer, v. XLV, No. 8, p. 84.

A Campaign Against Diphtheria—"During the last three years we have averaged thirteen cases per year with less than two deaths". Dr. James Roberts, Medical Officer of Health, thus summarizes the achievement of Hamilton, Ontario (population, 130,000). In contrast, the period 1900-1926, shows a yearly average of 219 cases and 18 deaths. The use of toxin-antitoxin was commenced in 1922, and toxoid in 1926. Seventy-five per cent of the pre-school population have received treatment, — the explanation of Hamilton's outstanding success.

ROBERTS, J., The Canad. J. of Med. & Surg., v. 69, No. 2 (Feb.), pp. 37-48.

Water-Borne Typhoid Fever Still a Menace—Lessons of the first importance from 242 outbreaks in the

United States and 40 in Canada occurring during the period 1920-1929, with the evidence clearly summarized in 8 tables. The paper is a most valuable compilation of data of water-borne typhoid epidemics occurring in the past ten years.

WOLMAN, A. and GORMAN, A.E., Am. J. Pub. Health, v. XXI, No. 2 (Feb.), pp. 115-129.

Symposium on Meningitis—Six papers presented at a special session on meningitis at the American Public Health Association Meeting, Fort Worth, Texas, last October. Studies of an epidemic in Milwaukee (383 cases) by French, and of an epidemic in Saginaw, Michigan (264 cases) by Pickett, twenty years' experience of the Meningitis Division of the New York Department of Health, by Neal, discussion of serum therapy by Wadsworth, control measures on ships by Geiger and a survey of incidence and source on Pacific coast in 1929 by Perry, constitute this important symposium.

Am. J. Pub. Health, v. XXI, No. 2 (Feb.), pp. 130-176.

Food as a Preventive of Disease—An outline of the part played by vitamins and other factors in the so-called deficiency diseases, the relatively little change in value of milk when pasteurized and the effect on cereals of bleaching by chlorine and fumigation by cyanide gas. Discussion by members of the Section of Epidemiology and State Medicine is included.

HAMILL, J. M., Proceedings of the Royal Society of Medicine, v. XXIV, No. 3 (Jan.), pp. 289-300.

